



Piney Lakes Management Plan

May 2004



— City of —
Melville

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1. INTRODUCTION

1.1 Purpose and Scope

This Management Plan has been prepared to provide the City of Melville with a five year program for the long term protection, conservation and restoration of Piney Lakes Reserve for the period 2004 to 2009. This Plan is to be reviewed and updated after this five year period.

The Management Plan is a strategic document and it is envisaged that more detailed specific plans may be required prior to implementation (such as weed control plans, monitoring programs and vegetation rehabilitation plans).

The Management Plan is based on a review of the Concept Plan prepared for the Reserve in 1992 (Ecoscape and Landmarc, 1992), ecological studies (Rodda, 1986) and recent site investigations and a community workshop conducted by ATA Environmental in 2003. The objective is to produce an updated and expanded plan for the bushland, wetland and parkland environments in the Reserve.

On this basis, the Management Plan addresses the following issues for the bushland and wetland areas:

- The long term conservation of the remnant bushland, including the development of wildlife corridors and significant habitat;
- Water quality of the lake and impacts and ways in which to maintain good lake water quality and prevent potential contamination of the water entering the lake in the long term;
- Appropriate environmental management for the area in balance with the lake's recreation objectives;
- Restoration and rehabilitation of riparian and aquatic communities to ensure the long term viability of existing flora; and
- The establish of a baseline environment data set and overall vegetation inventory for the City of Melville, which will act as a tool for environmental planning and management, and which will also provide important information on the conservation status of aquatic and riparian vegetation communities in the reserve.

1.2 Location, Size and Land Use Zoning

Piney Lakes Reserve is a bushland and wetland remnant surrounded by urban development in the suburb of Winthrop in the City of Melville. The Reserve is bounded by Leach Highway to the north and Murdoch Drive to the east. Minor roads of the Winthrop residential area form the western and southern boundary of the Reserve.

The Reserve encompasses approximately 67ha, comprising around 50ha of bushland and wetland environments (often referred to as the 'conservation area') and about 17ha of developed parklands to the south and west.

Piney Lakes Reserve and Blue Gum and Booragoon Lakes, located to the north-east of the Reserve, form the northern extent of the Beeliar Regional Park, a north-south chain of wetlands and bushland on the Swan Coastal Plain. CALM manages sections of Beeliar Regional Park and has a coordinating role through the preparation of the Beeliar Regional Park Draft Management Plan 2001-2011 (BRPMP) which was released for comment in 2001.

The BRPMP divides the Reserve into two areas (Area 5 & Area 6). Under the BRPMP Area 5 falls into the 'Conservation and Protection' management zone and Area 6 falls into the 'Recreation' management zone. The classification of these areas may change in future as described under the heading: 'Land Tenure' of the BRPMP

The application of the BRPMP to the study area is discussed in more detail in Section 1.3.3.

The Reserve was also identified as comprising values of regional significance under the Bush Forever project (Government of WA, 2000) and is identified as Bush Forever Site 339.

Prior to 1984, the Piney Lakes area formed part of The University of Western Australia's endowment land. Following the expiration of the Forests Department's 50 year lease of the land in 1976, the University commenced progressive development of the surrounding land for residential lots. Approximately 50ha comprising the Piney Lakes wetlands and bushland was purchased by the Metropolitan Regional Planning Authority (now the Western Australian Planning Commission (WAPC)) in 1984 and reserved for regional open space.

The Reserve is owned in freehold by the WAPC and vested with the City of Melville. It is currently zoned 'Parks and Recreation' under the Metropolitan Region Scheme and 'Regional Reserve' under the City of Melville's Community Planning Scheme No. 5.

The reserve is vested for the purpose of 'Parklands and Environment Centre'.

1.3 Relevant Studies and Existing Information

1.3.1 Piney Lakes Reserve – Ecological Study 1986

The Piney Lakes Reserve Ecological Study was undertaken by Jan Rodda of Murdoch University in 1986 with the primary objectives of determining the natural resources of the Reserve and the identification of strategies to manage the potential impacts of urbanisation. The report also provides a comprehensive overview of the history of the Reserve including previous land uses and management initiatives. The following summary of results and recommendations is taken from the report:

- The reserve is of considerable value to wildlife in the metropolitan area. It is an important site for visiting and residing birds, and is the habitat for the threatened Southern Brown Bandicoot (however, this species has not been observed recently);
- There are at least 110 species of native flora on the Reserve;

- The Closed Forest and Open Woodland in the eastern portion of the Reserve are of high conservation value and should be protected as such;
- The vegetation in and around the lake needs attention for both functional and aesthetic reasons. In order to maintain a healthy wetland ecosystem it is vital that the role of substantial fringing and buffer vegetation is recognised;
- The effects of rapidly increasing urbanisation will be irreversibly damaging to the native flora and fauna unless a comprehensive management plan is promptly implemented;
- Appropriate fencing should be installed at the perimeter of the Reserve to prevent the impact of off-road vehicles;
- The impacts of urban stormwater into the Reserve needs to be addressed through the installation of adequate retention sumps on the upland areas. The sumps should include a layer of finely crushed limestone to minimise the effect of phosphates and other pollutants in the ground and surface waters; and
- On-going monitoring of water quality and quantity in the sumps and ground/surface waters should be conducted in order to assess the levels of pollutant loads and groundwater fluctuations, and thereby act accordingly.

1.3.2 Piney Lakes Concept Plan 1992

Subsequent to the recommendations of the Rodda study (1986), the City of Melville in association with the Department of Planning and Infrastructure (DPI) (then Department of Planning and Urban Development), commenced planning for the future development and management of the Piney Lakes Reserve in 1990. To assist this process the Piney Lakes Reserve Advisory Committee was established and consisted of local residents, the Wetlands Conservation Society, DPI and City of Melville. The proposals for the Reserve were collated to form the Piney Lakes Reserve Concept Plan prepared by Ecoscape and Landmarc Consultancy in 1992, as shown in Figure 2.

Following extensive community consultation and comment by relevant government agencies, the Piney Lakes Concept Plan was adopted by the Melville City Council and endorsed by DPI in 1993.

The Concept Plan identified the following proposals for the Reserve:

- Preservation and reinforcement of the pristine dampland area;
- Restoration of the fringing vegetation around the entire perimeter of the lake to a minimum width of 70m;
- Rehabilitation of native bushland in the northern half of the Reserve;
- Establishment of 15-20ha of passive parkland in the southern portion of the Reserve;
- Construction of an Environmental Education Centre to the north of the lake;
- Construction of a Community Arts Centre in the southern peninsular;
- Provision of walk trails, cycle paths and boardwalks; and
- Construction of an integrated sensory playground.

A number of the proposals for the Reserve have been implemented or are scheduled for implementation as part of the City of Melville's works schedule. Planting and weed control in the Reserve have been ongoing since 1993 and landscape development works commenced in 1997.

The Environmental Education Centre was opened in November 2001 and hosts events which focus on ecological sustainability. Since its inception, the Centre now forms part of a 7.5ha Community Sustainability Precinct Concept Plan which addresses the future development of areas around the centre including:

- Native animal house and breeding sanctuary;
- Outdoor community gathering area;
- Native plant nursery;
- Botanical garden; and
- Short term camping site.

The future proposals for the 7.5ha Sustainability Precinct, shown in the inset in Figure 6, are not addressed in this Management Plan.

1.3.3 Beeliar Regional Park Draft Management Plan 2001-2011

The Management Plan (Draft) for the Beeliar Regional Park (CALM *et al.*, 2001) defines 41 geographical areas within the Beeliar Regional Park and groups these into four Management Zones. The BRPMP indicates the Piney Lakes Reserve is comprised of Area 5 and Area 6. Furthermore, it groups these into Management Zones of 'Conservation and Protection' and 'Recreation', respectively (refer to Figure 4 and Table 1 of the BRPMP).

The management objectives for the wetland and surrounding area at Piney Lakes, according to the Beeliar Regional Park Draft Management Plan 2001-2011 are identified in the following table.

TABLE 1
MANAGEMENT ZONES OF THE PINEY LAKES RESERVE AS IDENTIFIED
IN THE BEELIAR REGIONAL PARK DRAFT MANAGEMENT PLAN 2001-2011
(CALM, ET AL, 2001)

Management Zone	Management Emphasis	Acceptable Uses and Facilities
Wetland Area BRPMP Area 5	The management emphasis of this zone is to protect and where possible, enhance the conservation values and landscape qualities of the Park. Priority will be given to maintaining the natural state of Conservation and Protection areas with a minimum of impairment. Visible evidence of management will be minimal.	Restricted public access. Unauthorised watercraft and vehicles prohibited. Development of facilities such as boardwalks and observation platforms are acceptable in certain locations. Protection and enhancement of natural habitats to ensure survival of wetland ecosystems is considered essential. Education and research uses allowed.
Bushland area surrounding wetlands & upland park - BRPMP Area 6	The prime emphasis of management will be to provide a variety of recreation opportunities. The type and scale of facilities provided will depend on the values of any given area, community demand for recreation and the appropriate management of the Park. Management involves minimising the impact of visitor activities through the sensitive placement and provision of access and facilities. Visible evidence of management may be high.	Public use may be high in these areas. Predominantly passive recreation pursuits, allowing for park and picnic facility development. Commercial concessions may be considered appropriate within this management zone. Rehabilitation, landscaping and reticulation of areas may be necessary

1.3.4 Classification under the Land Administration Act

The BRPMP states that Reserves created from WAPC freehold land and vested with the Conservation Commission of Western Australia will be afforded an appropriate purpose for the protection and enhancement of (Beeliar Region) Park values and will be classified as Class A under the Land Administration Act (LAA).

Furthermore, the BRPMP states that, as agreed to by relevant local governments (such as City of Melville), reserves created from WAPC freehold land and vested with local government (such as Piney Lakes Reserve) will be reserved for the purpose of 'Conservation and Recreation' and afforded similar tenure arrangements as the reserves vested in the Conservation Commission of Western Australia.

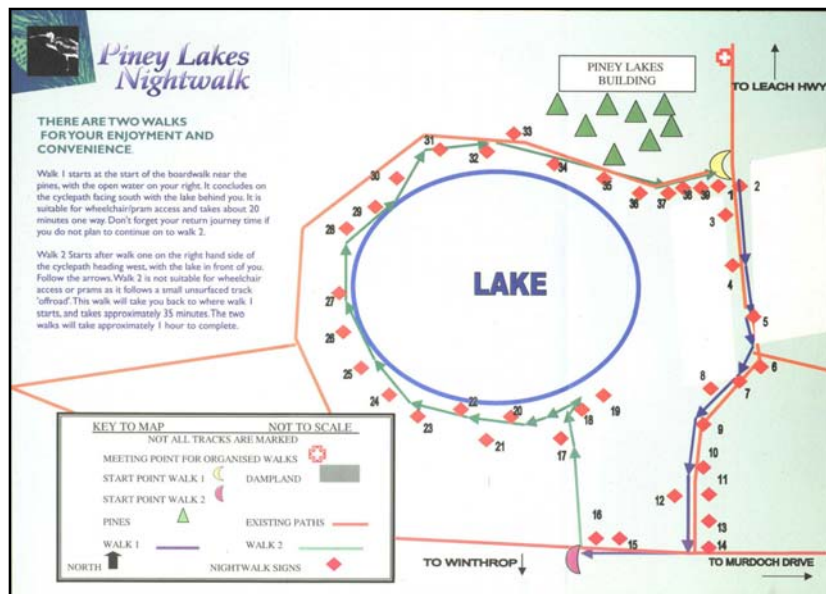
In other words, the Piney Lake Reserve, which was created from WAPC freehold land, vested with the City of Melville and reserved under the BRPMP as Area 5 'Conservation and Protection and Area 6 'Recreation' respectively, will with the agreement of the City of Melville, be classified as Class A under the LAA.

1.4 Current Projects at Piney Lakes

The following projects and programs have been implemented or are in progress at Piney Lakes Reserve:

- **Nutrient and Irrigation Management Plan**
Prepared by Ken Johnson in 1997, the Plan identified management strategies to minimise nutrient loss following the establishment of the grassed parkland in the southern region of the Reserve. The strategies are currently monitored annually as part of a compliance audit. In addition, groundwater, soil and leaf sampling has been undertaken by the City of Melville since 1997 and includes testing of nutrient levels, heavy metals, salinity and pH.
- **Direct Seeding Trails**
The City of Melville Environmental Services has been successful in receiving a number of grants to assist with improving biodiversity by undertaking seed trials in bushland reserves within the City of Melville. The Perth Biodiversity Project has provided funding to pay for and manage a seed trial in Piney Lakes and Wal Hughes Reserve to determine if local seeds can be used effectively to regenerate bush reserves. Current information about the success of direct seeding in the Perth Metropolitan Area is limited. This project therefore will provide the City of Melville with vital information to help improve environmental management in all bushland reserves including Piney Lakes.
- **Planting Trials – Friends of Piney Lakes Reserve**
Implemented to monitor the success of planting activities in 2003.
- **Ongoing activities with the Friends of Piney Lakes including assisting the City of Melville to regenerate areas and improve bushland condition.**
- **Ongoing education programs at the Piney Lakes Environmental Education Centre.**

- Piney Lakes Reserve Nightwalks – currently held each month during spring and summer in conjunction with the Friends of Piney Lakes. The walk provides an opportunity to learn about wetland animals and plants and the management initiatives of the City of Melville and Friends of Piney Lakes.



Nightwalk brochures are available from the City of Melville offices and the Education Centre

- Stepping Stones Project – Greening Australia (WA)
 This new community education program brings together schools, their local community and local government to work in partnership to protect and restore the ecological health of the local landscape. According to Greening Australia, Stepping Stones enables a more integrated and coordinated approach to be taken to the protection and enhancement of the native flora and fauna within local communities. Underpinning the program is a commitment to work with and engage the local community in a social process that is both participatory and experiential and works to achieve its ecological and social aspirations.

2. EXISTING ENVIRONMENT

2.1 Climate

The area experiences a Mediterranean climate which is characterised by mild wet winters and hot dry summers. Bureau of Meteorology data dated 28 May 2001 (Bureau of Meteorology website) indicate the long-term annual average rainfall recorded in Perth is 870mm. Mean monthly rainfall is greatest during the months of May, June, July and August. Lowest monthly average rainfall occurs in January, February and December.

February is the hottest month of the year with an average maximum temperature of 30.0°C while July is the coolest month with an average maximum of 17.4°C. Mean minimum temperatures range from 9.0°C in July to 18.1°C in February.

The annual average daily evaporation for Perth is 4.8mm with the highest average evaporation of 8.1mm occurring in January and the lowest evaporation of 2.0mm in July. The annual mean daily evaporation suggests an average of about 1752mm of evaporation occurs annually. Data collected between May 2002 and May 2003 indicates that the evapotranspiration rate at Piney Lakes varies from 0.4mm in July to over 10.5mm in December.

2.2 Landform and Soils

The Piney Lakes Reserve can be divided into four main topographic components; the low-lying areas including the wetland basin, the slopes surrounding the wetland, the east-west ridge across the northern part of the Reserve and the undulating plain to the south-east.

According to Ecoscape and Landmarc (1992), the wetland basin is almost flat with a slight incline of less than 1% towards Piney Lake. This area varies from 9m AHD in the centre of Piney Lake to 14m AHD east of the dampland adjacent to Murdoch Drive. To the north and south of the wetland the land gently rises to about 22m AHD. A high point of 28m AHD occurs at the north-western boundary along Paterson Gardens.

The Reserve is located at the transition of the Spearwood and Bassendean Dune Systems. The Karrakatta soils (of the Spearwood Dune System) are the most dominant in the Reserve with the Bassendean soils only occurring in the eastern region of the Reserve. The Karrakatta soils are generally yellow, with limestone at depth. The older Bassendean soils are generally pale grey or faintly yellow quartz sands which are very infertile as minerals and plant nutrients have been largely leached out by rainwater.

Associated with lakes and swamps within the Bassendean and Spearwood dunes are peaty soils known as Herdsman. The soils of the wetland basin have been modified through inundation, high water tables and deposition of organic material. These soils are dark brown to black with variable amounts of organic matter and are either moist or seasonally waterlogged.

The topography of the Reserve is shown in Figure 3.

2.3 Hydrology

2.3.1 Wetlands

The Piney Lakes Reserve includes two interconnected wetlands which form part of the Beeliar wetland chain. According to the Wetlands Atlas (Hill *et al.*, 1996) the wetlands are seasonally inundated basins and are therefore defined as 'sumplands'. The sumplands vary in that the western sumpland – Piney Lake contains permanent water covering 3.5ha while the eastern sumpland only occasionally has water expressed at ground level and encompasses over 12ha. According to the classifications contained in the Wetland Atlas, the western sumpland (Piney Lake) would be more appropriately identified as a lake rather than a sumpland due to water being present throughout the year. The wetlands are linked by an intervening low ridge which is seasonally waterlogged and therefore forms part of the wetland area. The total wetland area of the Reserve is approximately 20ha.

The WRC considers the wetlands at Piney Lakes Reserve to have high conservation value including natural attributes/ecological values and social values and has accordingly assigned a management category of 'Conservation'. Conservation category wetlands are the highest priority wetlands for protection on the Swan Coastal Plain. The management objective of Conservation Category Wetlands is to preserve and enhance the existing conservation values of the wetlands. No development or clearing is considered appropriate in the wetland area.

The eastern wetland is identified under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP) which prohibits unauthorised filling, mining, drainage into or out of, and discharge of effluent. The EPP Lakes have been selected for inclusion in this policy on the basis that they consisted of areas of standing water of 1000m² or more as at 1 December 1991. EPP Lakes have the highest level of protection under the Environmental Protection Act, 1986.

The boundary of the wetlands at Piney Lakes Reserve according to the WRC Wetland Atlas is shown in Figure 3.

2.3.2 Groundwater

Piney Lake and the adjoining dampland are surface expressions of the underlying groundwater level, which fluctuates approximately 0.8m on a seasonal basis (Johnston, 1997). The depth to groundwater in the upland areas of the Reserve varies from 3m to 15m AHD (WRC, 1997)

The local groundwater flow in the area is northward to the Canning River via Booragoon Lake and Blue Gum Lake.

The changing water level in Piney Lake has been documented in Rodda (1986) and Ecoscape and Landmarc (1992). These studies identify that there is evidence of a long-term increase in groundwater levels in the region which is indicative of the changes brought about by the clearing of native vegetation, the establishment and subsequent felling of the pine plantation, and urbanisation of the surrounding area.

According to Ecoscape and Landmarc (1992), records indicate that prior to the establishment of the pine plantation in the 1920s Piney Lake was considerably smaller

and shallower than it is today. The clearing of native vegetation led to a rise in the water level of between 1 and 2 metres. Groundwater levels fell slightly over the next 50 years with increased water use by the maturing pines. The clearing of most of the pine plantation again led to a gradual rise in water levels. This was accentuated in the mid-1980s with the surrounding urbanisation and subsequent storm water disposal into the Reserve. Since then groundwater levels have remained high, with some lowering of levels as a result of increased water extractions from domestic bores and seasonal low rainfall levels.

2.3.3 Stormwater Disposal

The Piney Lakes Reserve was identified as the natural stormwater drainage catchment for the proposed development of land to the south and east for residential in the early 1980s. The need to dispose of stormwater from the surrounding future development to Piney Lakes was accepted by the WAPC (then Metropolitan Region Planning Authority) at the time of purchase from the University of WA (UWA) and was therefore incorporated into the development design.

However, in 1985 UWA commissioned LeProvost Semeniuk and Chalmer to undertake a study to determine the potential impact of stormwater discharge on the Piney Lakes wetlands, and how to avoid or mitigate any adverse effects which may arise from the discharge of stormwater. The study identified that catchment drainage should meet the following objectives:

- Excessive water level fluctuations should be avoided;
- Particulate matter is removed from incoming waters; and
- The nutrient content of the water does not cause degradation of the water quality of the wetlands.

To achieve these aims, the study identified that the preferred option was to construct infiltration basins or drainage sumps with no direct discharge into the wetland system.

As a result, stormwater runoff from the surrounding residential areas and road network is directed to two locations:

- Drainage basin on Murdoch Drive (at the eastern boundary of the Reserve), which has an overflow drain (approximately 4m by 300m) located to the north of the dampland.
- A drainage basin located in the southern peninsular of the Reserve adjacent to Sinclair Avenue (this basin forms an artificial wetland surrounded by plantings).

2.4 Vegetation and Flora

2.4.1 Previous Studies

Previous vegetation and flora surveys and assessments of the Piney Lakes Reserve have been undertaken by Ecoscape and Landmarc Consultancy (1992), Jan Rodda, (1986) and LeProvost, Semeniuk and Chalmers (1985). In light of the fact that an assessment of the site had not been undertaken for over 10 years, an up to date vegetation and flora survey of the site was required.

2.4.2 Assessment Methodology

An assessment of the vegetation and flora of Piney Lakes Reserve was conducted by a botanist from ATA Environmental over two separate days on 14 May and 29 May, 2003. The timing of the survey did not allow for the identification of annual and ephemeral species such as orchids and grasses. The survey was conducted by traversing the site by foot. All major landforms and vegetation communities were surveyed, as identified using a 1:4000 colour aerial photograph. The vegetation was described and mapped according to the structure and species composition of the dominant stratum using the system of Specht as modified by Aplin (1979).

All native and non-native plant species were recorded and vegetation types mapped and the condition of the vegetation was described based on the rating scale used by Keighery (1994).

Surveys and assessments of the site were previously undertaken by Ecoscape and Landmarc Consultancy (1992), Jan Rodda, (1986) and LeProvost, Semenuik and Chalmers (1985).

Prior to undertaking the survey, ATA Environmental undertook a search of CALM's Declared Rare and Priority Flora database to identify any Rare or Priority species potentially occurring in the study area. The search identified ten species of Declared Rare Flora or Priority Flora (1 DRF taxa and 9 Priority listed taxa) that have previously been recorded from the vicinity of the Reserve.

2.4.3 Vegetation Complexes and Types

A total of 17 broad native vegetation types were identified in the Reserve. These are indicated in Figure 4 and described as follows:

Piney Lake

LOFMr *Melaleuca raphiophylla* Low Open Forest. *Melaleuca raphiophylla* dominated Low Open Forest to 10m with scattered planted introduced *Eucalyptus citriodora* over a Tall Open Shrubland dominated by *Acacia saligna* and *Melaleuca thymoides* with *Jacksonia sternbergiana*, *Adenanthos cygnorum*, *Hakea prostrata*, *Melaleuca lateritia*, *Macrozamia fraseri*, *Regelia inops* and *Acacia pulchella*. Numerous Tuart (*Eucalyptus gomphocephala*) seedlings were planted in this area. This vegetation was prominent in the area surrounding the primary area of open water associated with the western portion of the Reserve.

OSBaJp *Baumea articulata/Juncus pallidus* Open Sedgeland. This vegetation type is a *Baumea articulata/Juncus pallidus* dominated vegetation type with occasional scattered *Melaleuca raphiophylla* that immediately fringes the open water of Piney Lake. *Melaleuca lateritia*, *Astartea* aff. *fascicularis* and *Cyperus tenuiflorus* were less common components. The stems of several dead paperbarks were noted from along the edge and in the central portion of the Lake.

Wetlands

- LWMPBl *Melaleuca preissiana* and *Banksia littoralis* Low Woodland to Low Forest. The *Melaleuca preissiana* and *Banksia littoralis* trees dominate this vegetation type, which is up to 10m in height, with scattered Marri over an open heath dominated by *Acacia saligna*, *A. pulchella*, *Jacksonia furcellata*, *J. sternbergiana*, *Astartea fascicularis*, *Hypocalymma angustifolium*, *Daviesia triflora*, *Macrozamia fraseri* and *Gompholobium tomentosum*. This vegetation is most prominent over the eastern portion of the study area.
- LOWMp *Melaleuca preissiana* Low Open Woodland. *Melaleuca preissiana* dominates this vegetation type, which is to 10m tall with scattered Marri (*Corymbia calophylla*), Swamp Banksia and Holly-leaved Banksia (*Banksia ilicifolia*) over a low open shrubland comprised of *Acacia pulchella*, *Astartea fascicularis*, *Pultenaea reticulata*, *Jacksonia furcellata*, *Hypocalymma angustifolium*, *Hibbertia subvaginata*, *Petrophile linearis*, *Daviesia triflora*, *Macrozamia fraseri*, and *Gompholobium tomentosum*. This vegetation is prominent over a small area in the central southern portion of the study area.
- LCFMp *Melaleuca preissiana* Low Closed Forest. *Melaleuca preissiana* dominates this vegetation type, which is up to 20m in height over a closed sedgeland dominated by *Baumea articulata*. The Priority 3 listed taxa *Aotus cordifolia* was also a prominent component of the understorey throughout this vegetation type. This vegetation is most prominent in the southeastern corner and the central core of the study area.
- LCFMr *Melaleuca raphiophylla* Low Closed Forest. *Melaleuca raphiophylla* to 10m tall dominates this vegetation type with occasional scattered Flooded Gum (*Eucalyptus rudis*), *Banksia littoralis* over an understorey dominated by *Acacia saligna*, *A. pulchella*, *Hypocalymma angustifolium* and *Daviesia triflora*. This vegetation is prominent over a small area within the central portion of the study area.
- WMPcC *Melaleuca preissiana* and *Corymbia calophylla* (Marri) Woodland to 15m.

Upland Areas

- TWCc Marri (*Corymbia calophylla*) Tall Woodland. This transitional vegetation type to 20 m tall occurs over the southeastern corner of the study area. The understorey is degraded with only a few native plant species including *Jacksonia furcellata*, *J. sternbergiana*, *Daviesia physodes* and *Acacia pulchella*.
- OWCc Marri (*Corymbia calophylla*) Open Woodland. This open woodland to the north of Piney Lake, is dominated by Marri, with scattered mature planted *Eucalyptus citriodora* trees over a relatively degraded understorey comprised of *Acacia saligna*, *Xanthorrhoea preissii* and *Adenanthos cygnorum*. Rose Pelargonium (*Pelargonium capitatum*) and Wild Oats (*Avena barbata*) infestations occurs throughout this vegetation type.

- CSAc Woolly Bush (*Adenanthos cygnorum*) Closed Shrubland. This vegetation type, which has been previously cleared, is comprised almost completely of colonising *Adenanthos cygnorum*, with some *Banksia menziesii*, *Acacia saligna* and *Dianella revoluta* planted on the periphery of the area.
- OSAcAs *Acacia saligna* and *Adenanthos cygnorum* Open Shrubland. This previously cleared area is almost completely dominated by colonising *Adenanthos cygnorum* and *Acacia saligna*, with scattered *Jacksonia furcellata* and introduced weed species including Wild Oats and Pigface.
- CHAcAs *Acacia saligna* and *Adenanthos cygnorum* Closed Heath. This vegetation type is similar in species composition to Open Shrubland vegetation type, but is structurally more intact and closed with fewer introduced weed species present.
- LH (mixed) Mixed Low Heath - This vegetation is the most species rich within the Reserve with more than 40 native species recorded. Although no one species dominates this vegetation, species that were common included *Hibbertia hypericoides*, *Gompholobium tomentosum*, *Daviesia decurrens*, *Stirlingia latifolia*, *Xanthorrhoea preissii* and *Acacia pulchella*.
- CLH (mixed) Mixed Closed Low Heath – This vegetation type is floristically similar but less diverse than the Mixed Low Heath vegetation type.
- OWLc *Lophostemon confertus* dominated Open Woodland. This vegetation type, north of Piney Lake, is comprised of introduced plantings of *Lophostemon confertus*
- TOSJfAc *Jacksonia furcellata* and *Acacia saligna* Tall Open Shrubland
- LSAcJfAs *Adenanthos cygnorum*, *Acacia saligna* and *Jacksonia furcellata* Low Shrubland

2.4.4 Floristic Community Types

The Floristic Community Type study of vegetation on the Swan Coastal Plain (SCP) was developed by Gibson *et al.* (1994) and is based on an underlying concept that flora species occur in groups as a response to environmental factors and that defining such groups of species over the SCP would enable individual stands of vegetation to be assigned to a group of sites with similar flora composition. In general, floristic community types comprise groups of flora that consistently occur together.

The floristic composition of the bushland in Piney Lakes Reserve belongs to the seasonal wetlands centred on the Bassendean Dunes, that is Super Group 2 classification of Gibson *et al.* (1994), which is associated with wetland areas. Because of the degraded and weed infested natures of the upland areas of the Reserve, no FCTs could be inferred.

According to Gibson *et al.* (1994), Group 2 is highly variable, having by far the largest number of community types which are more or less uniformly spread across the SCP. In general, this group has low species richness with weed frequency moderately high.

Under the Group 2 classification, the study area comprises the following Floristic Community Types:

- FCT 4 *Melaleuca preissiana* damplands
- FCT 5 Mixed Shrub Damplands
- FCT 12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

FCT 4 is distributed over the length of the Swan Coastal Plain and is generally found on the Bassendean or Southern River Units. This shrub rich community generally has *Melaleuca preissiana* as an overstorey. *Pericalymma ellipticum*, *Hypolaena exsulca*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius* are the most common species of this community type.

FCT 5 has no consistent dominant overstorey. Dominants may include Holly-leaf Banksia (*Banksia ilicifolia*), *Melaleuca preissiana*, *Actinostrobos pyramidalis* and Spearwood (*Kunzea ericifolia*). It generally has open ground and an open shrub layer and occurs in the Bassendean, Vasse, Herdsman and Beermullah land units.

FCT 12 is generally dominated by *Melaleuca teretifolia* and/or *M. raphiophylla*, with *Lepidosperma longitudinale*, *Astartea fascicularis* commonly occurring. This community type is restricted to the moderately deep seasonal wetlands of the Bassendean and Southern River units.

2.4.5 Vegetation Condition

Most of the vegetation associated with the wetland area in the eastern portion of the Reserve is in Very Good to Excellent condition with smaller patches in the south-east of the Reserve, abutting the grassed area in Good condition. Several constructed, formally designated paths that dissect the Reserve, have been established to control and direct pedestrian access. The vegetation to the north of Piney Lake and the wetlands displays evidence of having been significantly modified and is rated as Good to Degraded condition.

Invasive weeds such as Bracken (*Pteridium esculentum*) are restricted to the minor areas on the fringes of the wetlands in the eastern portion of the Reserve while Rose Pelargonium (*Pelargonium capitatum*) and Pigface (*Carpobrotus edulis*) are dominant through upland vegetation types throughout the Reserve. Perennial Veldt Grass (*Ehrharta calycina*) and Wild Oats (*Avena barbata*) occur throughout the degraded areas of the Reserve. The small remnants of the Pine plantation that grew over much of the Reserve is considered to be in a Degraded condition.

The condition of the bushland has been mapped according to the Bush Forever categories (Government of WA, 2000) as shown in Figure 5.

2.4.6 Greenways

Piney Lakes forms part of Greenway 82 which links the Reserve to the Swan River via Wireless Hill and Greenway 90 which includes a link between Blue Gum, Booragoon, Piney, Bibra, North, Little Rush, Yangebup and Thomsons Lakes.

Greenways is a generic term that has been applied to a wide range of landscape planning strategies, concepts and plans (Alan Tingay and Associates, 1998). It has been defined as “networks of land containing linear elements that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable use” (Ahern, 1995).

According to CALM *et al.* (2001), it is important to maintain and improve Greenways corridors and other links between and within Beeliar Regional Park to adjoining areas of ecological significance. This is necessary to help maintain the diversity and vigour of the Park’s ecological systems and to help integrate the Park within the broader urban and industrial landscapes.

2.4.7 Conservation Value of the Vegetation

Piney Lakes reserve has been recognised as comprising values of regional significance as part of the Bush Forever project. Piney Lake Reserve, Winthrop (Bush Forever Site 339) meets a number of criteria for regional significance including representation of ecological communities, diversity, rarity, scientific or evolutionary importance and protection of wetland vegetation (Government of WA, 2000).

In particular, the Reserve encompasses a large (over 32ha including open water) intact area of dryland and wetland vegetation representative of the Bassendean - Central and South and Karrakatta – Central and South Vegetation Complexes. The area was known to support habitat for a number of significant mammals including the Quenda. Recent predation by domestic animals is believed to have resulted in the local extinction of this species from the Reserve (Joe Tonga, pers. comm, 2003). It is the combination of these factors which led to its inclusion in Bush Forever.

A significant portion of the Bassendean Central and South Vegetation Complex has been cleared for the establishment of pine plantations and urban development. As a result, approximately 24% of the original distribution of this complex remains uncleared on the Swan Coastal Plain. While most of the Complex occurs south of the Swan River, a significant portion of the original extent of the Complex to the north of Perth is protected, or proposed for protection as part of Bush Forever (Government of WA, 2000) in the conservation estate. The implementation of Bush Forever will increase the reservation of this Complex on the Swan Coastal Plain from approximately 6% to 13%.

In terms of Floristic Community Types, Gibson *et al.* (1994) identified Types 4, 5 and 12 as ‘well reserved’ and ‘low risk’. That is, a significant area of these FCTs is in secure conservation reserves but sufficient remains uncleared to suggest that the floristic community type will in time be adequately protected through Government action. None of the Community Types present at the site are identified as Threatened Ecological Communities under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

2.4.8 Flora

A total of 177 species of flora (130 native, and 47 introduced flora) have been recorded from the study area during surveys of the Reserve undertaken between 1985 and 2003.

The most recent survey, conducted by ATA Environmental during May 2003, recorded a total of 123 species of flora, including 91 native and 32 introduced species (Appendix 1). The timing of the survey during this period did not allow for the opportunity to identify the full complement of the species likely to occur within the Reserve due to lack of flowering material on some perennial species and absence of annual and ephemeral species such as orchids and grasses.

All species recorded are flowering plants, except one cycad (*Macrozamia fraseri*).

2.4.9 Significant Flora

A search of the Department of Conservation and Land Management's Declared Rare and Priority Flora database was undertaken in May 2003 to identify significant flora known to occur at or in the vicinity of the Reserve. The search identified ten significant flora species as having been previously recorded from and in the vicinity of the Reserve. Only one species, the Priority 3 listed taxa *Aotus cordifolia*, had been previously recorded from the Reserve. Priority 3 taxa are taxa which are known from several populations and are not believed to be under immediate threat.

Numerous individuals (i.e. 100s) of the Priority 3 taxa, *Aotus cordifolia*, were recorded from the Piney Lakes Reserve during the May survey undertaken by ATA Environmental. These plants were recorded from the *Melaleuca preissiana* Low Closed Forest in the southeast portion of the Reserve.

2.4.10 Dieback

Dieback is a disease that affects many of our native plants and is caused by an introduced microscopic soil-borne fungus belonging to the genus *Phytophthora*. The *P. cinnamomi* fungus is the most widespread and destructive, being highly invasive and infecting the roots of a wide range of plants.

Vegetation surveys of the Reserve by Rodda (1986) and more recently by ATA Environmental (2003) did not record evidence of the disease, such as crown decline and deaths of susceptible species, and as such a specific survey to assess the distribution of dieback has not been undertaken and is not considered necessary at this stage.

2.5 Vertebrate Fauna

A number of vertebrate fauna surveys have been undertaken at the Piney Lakes Reserve, including a recent bird survey of the Reserve by Gole (2003) as part of the Perth Biodiversity Project; a bird survey undertaken in 1985 as part of the Royal Australian Ornithologists Union (RAOU) Metro Bird Project (in Ecoscape and Landmarc, 1992), and general observations as part of the ecological study of the Reserve by Rodda (1986).

2.5.1 Avian Fauna

Based on the findings of the vertebrate fauna surveys of the Reserve, birds are by far the most numerous both in terms of the number of different species and the number of individuals recorded.

Recent surveys of Piney Lakes Reserve by Gole (2003) identified a total of 54 bird species including 50 species in the bushland/wetland area and 26 species in the parkland (including the artificial wetlands) region of the Reserve. Of the species recorded, 13 are considered significant in Bush Forever of which ten were only recorded in the bushland area. According to Gole, these included small, resident, insectivorous declining species such as the Splendid Fairywren, White-browed Scrubwren and Western Thornbill. Only three significant species were recorded in the landscaped areas of the Reserve, including the Hardhead, a species of diving duck favouring deeper water, the Yellow-rumped Thornbill, a small insectivore using bushland and open areas, and the New Holland Honeyeater. Four bird species were recorded only in the parkland/landscaped areas, and not in the natural wetland. These were the Australian Wood Duck, Hoary-headed Grebe, Black-fronted Dotterel and the Silver Gull.

The birds recorded during the 2003 survey by Gole are listed in Appendix 2.

The survey undertaken in 1985 by the RAOU identified significant numbers of the Australian Raven in the Reserve and concerns were raised as to the predation of the eggs and young of other bird species by the Ravens.

It is probable that the Long-billed Black Cockatoo's identified by Rodda (1986) are Carnaby's Cockatoos (or Short-billed Black Cockatoos). Gole (2003) recorded only Carnaby's Cockatoos.

2.5.2 Amphibians

Rodda (1986) recorded six species of frog at the Reserve. This was considered to be diverse for a relatively small reserve and reflects the size and diversity of habitats found at the site. One frog species recorded during the 1986 survey, *Helioporus eyeri* is capable of living away from permanent water, only requiring flooded ground to breed.

2.5.3 Fish

The 1986 survey recorded one species of fish, the introduced Mosquito Fish (*Gambusia affinis*), in Piney Lake. The presence of this species was noted to be linked to increased tadpole predation and reduced frog breeding in Piney Lake.

2.5.4 Reptiles

One aquatic reptile, the Long-necked Turtle (*Chelodina oblonga*) has been recorded in relatively large numbers in Piney Lake (Rodda, 1986; Giles, 2001). A study of the population dynamics of the Turtle at Booragoon, Piney and Blue Gum Lakes by Giles (2001) identified the populations Piney Lakes appeared the most healthy, with evidence of successful recruitment into young age classes indicating that it may be a self-sustaining population. In particular, the study noted that the terrestrial buffer at Piney Lakes is comparatively large and while nest predation was noted, it did not appear to be as

significant as the extent of predation occurring at Blue Gum and Booragoon Lakes (Giles, 2001). Rodda (1986) and Giles (2001) noted the importance of the dryland buffer surrounding the wetlands at the Reserve, as breeding habitat for the Long-necked Turtle. The Turtle lays its eggs in the sandy areas away from the lake edge, with hatchlings returning to the lake to live.

Three species of terrestrial reptiles have been recorded at the Reserve including the Tiger Snake, Dugite and the Bobtail Lizard (Rodda, 1986). Rodda noted that a detailed fauna study would probably record at least ten species of skinks, lizards and snakes in the bushland areas at the Reserve.

2.5.5 Mammals

Two native mammals were recorded at the Reserve during the Rodda study in 1986 including the Southern Brown Bandicoot or Quenda (*Isodon obesulus fusciventer*) and the Brush-tailed Possum.

A small colony of Bandicoots was recorded in the Reserve in 1995. It was observed that the colony was in a state of decline due to pressures both from within and from outside of the park. The internal pressure was due mainly to a lack of habitat that included suitable hollow breeding logs and protection from fox predation. Outside pressure was attributed to problems associated with encroaching urbanisation and included an increase in people and domestic pets.

Although it was identified by Friends Group members during the community workshop that Bandicoots have not been identified in the Reserve and are therefore considered to be locally extinct, Robert Mengler (Ian Davis pers comm. Sept, 2003) reported seeing a Bandicoot in the Reserve in May 2003.

A list of vertebrate fauna recorded in the Reserve by Rodda (1986) is presented in Appendix 3.

2.5.6 Significant Fauna under the WA Wildlife Conservation Act 1950-1979

In Western Australia, all native fauna species are protected under the *Wildlife Conservation Act 1950-1979*. Fauna species that are considered rare, threatened with extinction or have a high conservation value are specially protected under the Act. In addition, some species of fauna are covered under the 1991 ANZECC convention, while certain birds are listed under the Japan and Australian Migratory Bird Agreement (JAMBA) and the China and Australian Migratory Bird Agreement (CAMBA).

Classification of rare and endangered fauna under the Wildlife Conservation (Specially Protected Fauna) Notice 1998 recognises four schedules of taxa. These are;

Schedule 1 – fauna which are rare or likely to become extinct and are declared to be fauna in need of special protection.

Schedule 2 – fauna which are presumed to be extinct and are declared to be fauna in need of special protection.

Schedule 3 – birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction which are declared to be fauna in need of special protection; and

Schedule 4 – fauna that are in need of special protection, otherwise than for the reasons mentioned in Schedule 1, 2 or 3.

In addition to the above classification, CALM also classify fauna under four different Priority codes:

Priority one – *Taxa with few, poorly known populations on threatened lands.* Taxa which are known from few specimens or sight records from one of a few localities on lands not managed for conservation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened species.

Priority two – *Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands.* Taxa which are known from few specimens or sight records from one or a few localities on lands no under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority three – *Taxa with several, poorly known populations, some on conservation lands.* Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority four – *Taxa in need of monitoring.* Taxa which are considered to have been adequately surveyed or for which sufficient knowledge is available and which are considered not currently threatened or in need of special protection, but could if present circumstances change. These taxa are usually represented on conservation lands. Taxa which are declining significantly but are not yet threatened.

Two species of fauna were identified by the Department of Conservation and Land Management as being potentially found in the area. There are Carnaby's Cockatoo and the Peregrine Falcon.

Schedule 1 - Fauna which are rare or likely to become extinct

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) - This species inhabits the southwest of WA. Its preferred habitat is the woodland where it preferentially feeds on plants of the Proteaceae family. In winter, flocks can be found in heaths as it utilises Jarrah and Banksia woodlands for feeding. Carnaby's Cockatoo occurs within Bold Park and is known to regularly occur within the Metropolitan area on a seasonal basis, utilising native bushland and suitable vegetation along roads and within backyards. It is likely to occur in the area in question.

Priority 4 - Taxa in need of monitoring

Peregrine Falcon (*Falco peregrinus*) – This species is found across most of Australia, but only occurs in low densities and has a wide and patchy

distribution. It favours hilly or mountainous country and open woodlands and may be an occasional visitor to the study area. One individual was sited at Lake Monger in 1994.

The Quenda or Southern Brown Bandicoot (*Isoodon obesulus fusciventer*) although not identified in the search of the threatened and priority species database is present on site. Quenda have coarse dark grey or yellowish brown fur above and creamy-white fur below, with a tapered brown tail. Quenda prefer dense scrub (up to one metre high), with swampy vegetation. They will often feed in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and crop land lying close to dense cover. They are usually nocturnal but can be active during the day. Quenda are omnivorous and the diet consists of invertebrates (earthworms, beetles, larvae), underground fungi and subterranean plant material.

Major threats to Quenda include habitat fragmentation and loss of habitat on the coastal plain and wheat belt, fire in fragmented habitat, predation by foxes, predation of young by cats and predation around residential areas by dogs.

2.5.7 Introduced Species

A number of introduced species have been observed at the Reserve, including the cat, fox, rabbit and house mouse (Rodda, 1986). All these species have the potential to be equally damaging to the environment at the Reserve. The impact of rabbits at the Reserve includes disturbance of native vegetation and revegetation works, and resultant weed invasion.

It is acknowledged that domestic pets such as cats and dogs are often important companions to people, however these pets can have quite significant impacts on native fauna. Dogs, when allowed to run freely, disturb wetland and bushland environments and native fauna habitat. They can crush the reed beds and disturb hiding and nesting habitat of water birds and aquatic wildlife. In addition, they can potentially alter the distribution of the Long-necked Turtle when they rush into the wetland (Giles, 2001).

2.6 Recreational, Educational and Heritage Values

2.6.1 Recreational Value

The Reserve currently accommodates a variety of passive recreational activities including, walking, jogging, cycling, nature study (including fauna observation), dog walking, children's play activities, night walks and community purposes/education. The significant area of parkland in the southern portion of the Reserve provides an open area for exercising and other activities with strategically located paths and boardwalks providing access within the bushland and wetland areas. The grassed area does not include facilities such as an oval to accommodate active recreational activities.

2.6.2 Existing Facilities & Infrastructure

Following the preparation of the Concept Plan for the Reserve (Ecoscape and Landmarc, 1992), a number of facilities and infrastructure were established to accommodate

increasing recreational use of the Reserve resulting from urbanisation of the surrounding suburbs, including:

- A strategic path network to provide alternative paths for pedestrians throughout the Reserve and cyclists at the perimeter of the Reserve.
- A boardwalk for controlled access in the wetland area.
- Open space and picnic areas to the south of the bushland and wetland conservation area.
- Car parking associated with the new Environmental Education Centre and the sensory playground.
- A sensory playground in the parkland area.
- An artificial lake adjacent to the playground, to provide a focus for recreation and relieve pressure on the wetland conservation areas.
- A strategic fire break system.

The Piney Lakes Environmental Education Centre was opened in 2001 and uses renewable technologies, sustainable building design and self-sufficient operations. The Centre showcases solar passive design and energy that is produced on site by a wind turbine and solar panels. It also demonstrates many other innovations with water, waste and materials, all in a building the size of a small school which helps visitors understand how to implement simple environmental solutions to their everyday lives.

The building is expected to eventually provide information through four principal means - a visual stimulation exhibition, public computer access to a comprehensive web site, a specially commissioned video presentation and a program of public artwork associated with environment themes relevant to Melville. The Centre forms part of the 7.5ha Sustainability Precinct, as shown in Figure 6.

2.6.3 Educational Value

A number of educational initiatives have been implemented at the Reserve including interpretive signage in the conservation area, night walks to educate and improve community awareness of the environmental values present in the Reserve, the development of the Environmental Education Centre and Stepping Stones project by Greening Australia (WA).

A number of these activities are organised by the active volunteer community group, the Friends of Piney Lakes, in conjunction with the City of Melville. The Friends of Piney Lakes also provide an important contribution to enhancing the educational and environmental value of the Reserve through various works, such as rehabilitation, which are generally undertaken every month in the Reserve.

A number of school groups actively use the Reserve for educational purposes, particularly the facilities at the recently established Environmental Education Centre. In addition, some schools, such as Corpus Christie College, in consultation with the City of Melville have been undertaking revegetation works within degraded regions of the Reserve (pers comm, Marie French, Friends of Piney Lakes).

Visitor numbers at the Environmental Education Centre have been recorded at 8,944 people during the opening year between September 2001 and June 2002, and 10,718 people during the 2002/2003 financial year.

2.6.4 Aboriginal Heritage

The wetland systems of the Swan Coastal Plain provided an important link to cultural traditions, spiritual life and history for Aboriginal people. Teaching of oral history, and corroborees concerning the area were a regular occurrence.

Aboriginal people associated with the area were members of the Beeliar group, whose land stretched between the Swan and Southern River and to the Canning River in the east. The prior habitation of this local tribal group is recognised in the recent naming of the Beeliar Regional Park, which includes many of the wetlands within the south-west metropolitan region.

Piney Lake is a very significant site for the traditional custodians of the area and is a sacred place for Aboriginal women. It was the women's area to perform ceremonies and to discuss women's business and to take young boys through their initiations. The site has been disturbed by several old forestry tracks and a firebreak, however the site is considered significant to Aboriginal people and is registered with the Department of Indigenous Affairs.

2.7 Community Consultation

2.7.1 Community Workshop

A community workshop was held at the Piney Lakes Environment Centre on 18 June 2003 to obtain community feedback regarding the main issues currently impacting the Reserve and how these should be managed.

Community participation at the workshop was invited through the placement of advertisements in the local community newspaper and posters at the City of Melville council offices. Invitations were sent to relevant stakeholders including the Friends of Piney Lakes Reserve, community members, local schools, Water and Rivers Commission, Greening WA, Fire & Emergency Services, Urban Bushland Council/Conservation Council, Beeliar Regional Park Community Advisory Committee and the Winthrop/Murdoch Community Group.

Participants at the workshop supported the development of the Plan to guide the management of the Reserve over the next five years. There was strong support for the Reserve to be managed as two distinct zones, with the wetland/bushland area managed principally for conservation purposes and recreation maintained in the modified southern region of the Reserve. Participants identified that passive recreation should be permitted to continue in the conservation area but should be controlled through the implementation of appropriate management strategies, including fencing, signage and education.

Participants at the workshop discussed what the principal management objectives for the Reserve should be and, identified the issues that needed to be addressed to meet the objectives.

The principal management goals for the Reserve as identified by participants are summarised as follows:

Bushland Restoration/Revegetation

- Maintain buffer zone around wetlands
- Revegetate degraded wetland and bushland areas.
- Collect local seed and use in revegetation works.

Dieback

- Not currently an issue, monitor for potential infection.

Weed Control

- Manage interface between bushland/wetland areas and parkland areas for weed encroachment.
- Key areas: within and around wetland (Couch and Typha in wetland).
- Prepare weed mapping and implement appropriate control measures.

Natural Wetlands

- Limit access.
- Prevent access to wetlands, particularly dogs.
- Educate community.

Artificial Wetlands

- Maintain existing artificial wetland, no further wetlands to be created.

Vertebrate Fauna

- Improve and maintain native fauna habitat (establish trees for roosting/nesting).

Domestic Pets and Feral Animals

- Control dog access – options: 1. Restrict access to parkland area / no access to conservation area; 2. Dogs to be on leash at all times in conservation area.
- Rangers to patrol dog access.
- Consider cat curfews for surrounding residences.
- Implement control of foxes and rabbits.

Fire Management

- Existing fire access, including fire breaks and paths are considered adequate in the event of a fire.

Access - General

- Maintain existing path network.
- No additional paths required through conservation area.
- Close and rehabilitate any informal paths.

Fencing

- Define the conservation area – install fencing to create sanctuary.
- Install temporary fencing to control access to rehabilitation (revegetation/weed control) areas.
- Appropriate fencing will be required around the Permaculture area to prevent weeds from entering the bushland/wetland.

Water Quality

- Implement water quality monitoring.

Car Parking

- Car parking adequate – requires lighting for safety.
- Solar lighting an option at Education Centre.

Signage

- Current signage which identifies dog restrictions is unclear and difficult to understand – requires simple signage.
- Signage to identify involvement of Friends group.

Rubbish / Litter Management

- Siting of bins needs to be considered – more bins at access points.
- Monitor potential spread of weeds from green-waste.

Aboriginal Heritage

- Restricted access, but do not fence to highlight area.

Educational Opportunities

- Opportunities to link with regional catchment groups / strengthen partnerships.

Maintenance of Information / Monitoring

- Co-ordinate works and collection of information.
- Community to have input where ever possible.

Other Management Issues

- Do not allow camping in the Reserve.
- No permaculture gardens.
- Animal breeding nursery is not appropriate.
- Establish a native plant nursery.

The minutes of the community workshop are presented in Appendix 4.

2.7.2 Release of Draft Management Plan for Public Comment

The Draft Piney Lakes Reserve Management Plan was released for public comment between 16 February and 19 April 2004. Copies of the Plan were available for review at the City of Melville, local libraries and digitally on the City of Melville's website.

A total of 33 submissions on the Plan were received from local residents, the Friends of Piney Lakes, CALM and the Wetlands Conservation Society. Each submission has been reviewed and relevant changes have been incorporated into this version of the Management Plan. Appendix 5 provides a summary of the submissions and resultant change that has been made to the Management Plan.

3. MANAGEMENT DIRECTIONS

3.1 Piney Lakes Reserve Values and Goals

3.1.1 Conservation

The conservation value of the Piney Lakes Reserve has been identified at a regional level with the identification of the area in Bush Forever and its inclusion in the Beeliar Regional Park. The conservation values are regionally significant and include a diversity of vegetation communities and habitats including upland woodland and heath, fringing wetland and a seasonal waterbody. As a result, the area supports a diverse floristic composition including one species of Priority Flora and provides habitat for a range of avian fauna, reptiles and amphibians in an urban setting.

The principal conservation management goal is to maintain and enhance the conservation values of the Reserve while recognising the need to accommodate recreational pursuits. Specifically, the goal will be to conserve the bushland and wetland environments by minimising the degree and impact of human disturbance.

3.1.2 Recreation and Access

The Reserve's recreational values are also significant and have been recognised by the provision of infrastructure and facilities to accommodate the various passive recreational pursuits currently favoured by the community. The Reserve is currently utilised for a number of passive recreational activities, including walking, jogging, picnics, nature observation and education, by local residents and the wider community.

The recreation management goals for the Reserve will be to:

- Ensure that the local community and visitors to the Reserve appreciate the natural and cultural values and feel ownership of the bushland; and
- To maintain the level of recreational activities currently accommodated and to ensure these activities are consistent with the conservation management objectives for the Reserve.

3.1.3 Heritage

The wetlands and associated bushland at Piney Lakes Reserve has significance to Aboriginal people as it was an area which provided water and food resources and was a ceremonial site. The heritage management goal will be implement conservation and recreational management objectives which respect the heritage values of the Reserve.

3.1.4 Education and Research

The bushland and wetland environments at the Reserve, and existing facilities including the Environmental Education Centre are significant educational value to the local and wider community. The educational goal for the Reserve will be to implement conservation management objectives to maintain the bushland and wetland areas as a educational resource and to continue to make available the existing educational facilities to the community.

4. CONSERVATION MANAGEMENT

4.1 Principal Conservation Directions

The principal conservation directions for the Reserve will be to:

- Maintain and enhance the conservation values of the Reserve by implementing appropriate management techniques while recognising the need to accommodate passive recreational pursuits; and
- Conserve the bushland and wetland environments by minimising the degree and impact of human disturbance.

4.2 Bushland and Wetland Restoration

The objective for the Reserve is to maintain and enhance the conservation values such that natural regeneration can occur in the wetland and bushland environments. This can be achieved by:

- Encouraging natural regeneration by preventing existing and potential disturbance factors.
- Promoting natural regeneration by implementing effective weed control measures.

At present, the central wetland area is in relatively good condition. The surrounding bushland area has generally established from natural regeneration, as a significant portion of this area was cleared for the pine plantation. Irrespective of past land use disturbances, the bushland and wetland vegetation is a good representation of the low-lying and upland areas of the Bassendean Dune system on the Swan Coastal Plain.

To ensure that these values are maintained and enhanced, the natural process of regeneration will need to be assisted in some areas of the Reserve by the implementation of rehabilitation measures such as weed control, followed immediately by revegetation. The implementation of revegetation works has been prioritised within the Reserve and follows the methodology employed by the Bradley approach which recommends working from areas in good condition to areas in poor condition. The highest priority area therefore is the wetland areas and surrounding upland area to approximately 50m. The balance of the bushland is relatively degraded in comparison, however the next priority should be the western region of the bushland followed by the north-eastern region, as shown in [Figure 6](#).

Any revegetation works should use locally native species to contribute to the on-going biodiversity within the Reserve and further ensure the retention of indigenous species. The Friends of Piney Lakes Reserve do not consider the establishment of a native seed nursery to be a priority due to other facilities such as APACE already available nearby.

If the revegetation works involve the use of tubestock, the plants should be as close to the seedling stage as possible and planted in late autumn/winter (May to July) to take full advantage of the winter rainfall. In most instances, younger plants are easier to establish and more successful than older plants. In cases where the use of seed is not appropriate,

plants should be raised from vegetative material and planted out as tube stock. The use of more mature tubestock is recommended to improve the success of future rehabilitation programs.

Direct seeding ensures a random growth pattern in revegetation areas. Any planting of tubestock should aim to achieve a random pattern such that even spacing and planting in rows should be avoided.

All revegetation works should form part of a broader rehabilitation project which includes weed control, if required, and importantly, follow-up monitoring and implementation of remedial works as necessary.

A number of areas have been identified within the Rehabilitation Priority Areas that will require the focus of revegetation works, as shown in Figure 6. These include the old forestry tracks, informal paths and tracks. In addition, revegetation works and weed control has been recommended along the entry road to the Environmental Education Centre. It is considered that the restoration of this area will demonstrate to the public and local community that they are entering an important site of significant environmental value.

The following table provides a list of the recommended native species (seed or tubestock) to be used in revegetation works within each Rehabilitation Priority Area.

TABLE 2
RECOMMENDED SPECIES LIST FOR REVEGETATION WORKS WITHIN
REHABILITATION PRIORITY AREAS AT PINEY LAKES RESERVE

Species	Habit	Rehabilitation Priority Area				
		P1			P2	P3
		Piney Lake	Eastern dampland	Wetland buffer area	Upland	Upland
<i>Allocasuarina fraseriana</i>	Tree				✓	✓
<i>Banksia attenuata</i>	Tree				✓	
<i>Banksia ilicifolia</i>	Tree			✓		
<i>Banksia littoralis</i>	Tree		✓			
<i>Banksia menziesii</i>	Tree				✓	
<i>Corymbia calophylla</i>	Tree			✓	✓	
<i>Eucalyptus gomphocephala</i>	Tree				✓	✓
<i>Eucalyptus marginata</i>	Tree				✓	
<i>Eucalyptus rudis</i>	Tree			✓		
<i>Melaleuca lateritia</i>	Tree	✓				
<i>Melaleuca preissiana</i>	Tree	✓	✓	✓		
<i>Melaleuca raphiophylla</i>	Tree	✓	✓	✓		
<i>Acacia saligna</i>	Tall Shrub			✓		
<i>Adenanthos cygnorum</i>	Tall Shrub			✓		✓
<i>Casuarina obesa</i>	Tall Shrub			✓		
<i>Hakea prostrata</i>	Tall Shrub				✓	✓
<i>Jacksonia furcellata</i>	Tall Shrub				✓	✓
<i>Jacksonia sternbergiana</i>	Tall Shrub			✓		
<i>Acacia pulchella</i>	Shrub				✓	
<i>Allocasuarina humilis</i>	Shrub				✓	✓
<i>Astartea fascicularis</i>	Shrub	✓				
<i>Beaufortia elegans</i>	Shrub			✓	✓	✓
<i>Bossiaea eriocarpa</i>	Shrub				✓	✓

Species	Habit	Rehabilitation Priority Area				
		P1			P2	P3
		Piney Lake	Eastern dampland	Wetland buffer area	Upland	Upland
<i>Calothamnus lateralis</i>	Shrub				✓	✓
<i>Calytrix fraseri</i>	Shrub				✓	
<i>Daviesia decurrens</i>	Shrub				✓	
<i>Daviesia divaricata</i>	Shrub				✓	✓
<i>Daviesia nudiflora</i>	Shrub				✓	✓
<i>Daviesia physodes</i>	Shrub				✓	✓
<i>Daviesia triflora</i>	Shrub				✓	✓
<i>Gompholobium tomentosum</i>	Shrub				✓	✓
<i>Hibbertia hypericoides</i>	Shrub				✓	
<i>Hypocalymma angustifolium</i>	Shrub		✓	✓		
<i>Hypocalymma robustum</i>	Shrub		✓	✓		
<i>Hibbertia racemosa</i>	Shrub				✓	✓
<i>Hibbertia stellaris</i>	Shrub				✓	✓
<i>Hibbertia subvaginata</i>	Shrub				✓	✓
<i>Hovea pungens</i>	Shrub				✓	✓
<i>Conostephium pendulum</i>	Shrub				✓	✓
<i>Hemigenia pungens</i>	Shrub				✓	✓
<i>Leucopogon australis</i>	Shrub				✓	✓
<i>Leucopogon capitellatus</i>	Shrub				✓	✓
<i>Macrozamia fraseri</i>	Shrub				✓	✓
<i>Melaleuca thymoides</i>	Shrub			✓		
<i>Pericalymma ellipticum</i>	Shrub		✓	✓	✓	✓
<i>Petrophile linearis</i>	Shrub				✓	✓
<i>Regelia inops</i>	Shrub			✓	✓	✓
<i>Scholtzia involucrata</i>	Shrub				✓	✓
<i>Stirlingia latifolia</i>	Shrub				✓	✓
<i>Viminaria juncea</i>	Shrub		✓	✓		
<i>Xanthorrhoea preissii</i>	Shrub				✓	
<i>Baumea articulata</i>	Sedge	✓	✓			
<i>Cyperus conquestus</i>	Sedge	✓				
<i>Cyperus polystachyus</i>	Sedge	✓	✓			
<i>Juncus pallidus</i>	Sedge	✓				
<i>Lepidosperma angustatum</i>	Sedge				✓	
<i>Conostylis aculeata</i>	Herb				✓	✓
<i>Conostylis candicans</i>	Herb				✓	✓
<i>Conostylis canescens</i>	Herb				✓	✓
<i>Conostylis juncea</i>	Herb				✓	✓
<i>Conostylis setigera</i>	Herb				✓	✓
<i>Dampiera linearis</i>	Herb				✓	✓
<i>Dasyogon bromeliifolius</i>	Herb			✓	✓	✓
<i>Patersonia occidentalis</i>	Herb				✓	✓
<i>Scaevola canescens</i>	Herb				✓	✓
<i>Sowerbaea laxiflora</i>	Herb				✓	✓
<i>Hardenbergia comptoniana</i>	Creeper				✓	✓
<i>Kennedia prostrata</i>	Creeper				✓	✓

Management Recommendations

- C1. Revegetation works should form part of a broader rehabilitation project which includes weed control, follow-up monitoring and implementation of remedial works, if necessary.

- C2 Revegetation to work from Priority Area P1, to P2 followed by P3, according to the Bradley method, with focal points to include old forestry tracks, informal paths and tracks and degraded areas as shown in [Figure 6](#).
- C3. Use mature tubestock of locally native species in revegetation works.
- C4. Undertake planting/seeding in autumn/winter.
- C5. Ensure random planting when using tubestock.

4.3 Invasive Weed Management

The management objectives for invasive weeds in the Reserve are to:

- Control weeds, giving priority to those which are causing conservation and public safety problems;
- Minimise potential impacts on the bushland and wetland as a result of implementing weed control activities;
- Ensure weed control activities are immediately followed by revegetation or works to promote natural regeneration;
- Ensure species selected for amenity plantings in the parkland areas are not potentially invasive;
- Provide assistance and support to community groups implementing weed control activities;
- Ensure all rehabilitation works in the Reserve are coordinated by the City of Melville.
- Ensure reticulated areas have a buffer zone so that weeds do not spread into bushland/wetland areas.

Invasive weeds in the bushland and wetland areas at Piney Lakes have the potential to inhibit the growth of native species and degrade native fauna habitat.

A number of invasive weed species were recorded in the Reserve during recent surveys by ATA Environmental including introduced Bulrush (*Typha orientalis*), Perennial and Annual Veldt Grass (*Ehrharta calycina*, *E. longiflora*), Pigface (*Carpobrotus edulis*), Lupin (*Lupinus* sp.), Victorian Teatree (*Leptospermum laevigatum*), Rose Pelargonium (*Pelargonium capitatum*) and *Lachenalia reflexa*.

Large stands of the introduced Bulrush (*Typha orientalis*) occur on the eastern margins of Piney Lake and is the dominant species in the sump adjacent to Murdoch Drive. This species is a known invasive weed, however it is also a valuable food source and hide for wildlife. In particular, many of the juvenile Long-necked Turtles captured from Piney Lake were collected from traps established in the *Typha* stands. In the past the City has implemented control of the *Typha* by cutting below the water line or by wiping with herbicide (Giles, 2001).

Without the implementation of weed control, and dependent on water levels in the Lake and sump, there is potential for the *Typha* population to spread and inhibit the growth of native wetland plants. On this basis, the stand in the Lake is to be monitored and control measures implemented to maintain or reduce the population as necessary.

It is possible that the stand of *Typha* in the sump provided a seed source for the invasion of this species into Piney Lake. The removal of the *Typha* from the sump will require either deepening or filling of the sump to inhibit the growth of this species. As the primary function of the sump is stormwater drainage, filling is not an option. Consideration should therefore be given to excavating the sump to remove the infestation and replant immediately with native species tolerant of seasonal inundation.

Concern was raised during the community workshop regarding the invasion of Couch Grass (*Cynodon dactylon*) from the parkland area into the bushland and wetland areas. The invasion of this species was noted in the area fringing the south-western boundary of the Piney Lake. Measures to control this weed species should be implemented as soon as possible and should not ensure further degradation of the wetland environment.

Priorisation of weed control activities in the Reserve should be undertaken in accordance with the Environmental Weeds Strategy for WA (CALM, 1999).

Management Recommendations

- C6. Prepare weed mapping for the Reserve, identifying the type and distribution of weed species in the Reserve.
- C7. Implement weed control within the Reserve according to the weed mapping and the Rehabilitation Priority Areas delineated in [Figure 6](#). Work from Priority Area 1 to 3.
- C8. Any weed control measures implemented in the Reserve need to consider the potential habitat that the weed may be providing for native fauna (ie. the habitat provided by *Typha* in the case of the Long-necked Turtle) and the potential impacts of herbicide application on the water quality of the wetland environments. Slow removal of the introduced *Typha* and replacement with native sedges may assist in protecting fauna habitats.
- C9. Any weed control activities implemented in the Reserve are to include a monitoring period so that remedial work can be implemented, if necessary.
- C10. Ensure all weed control activities are immediately followed by revegetation or works to augment natural regeneration.
- C11. Ensure species selected for amenity plantings in the parkland areas are not potentially invasive.
- C12. Monitor sprinkler overspray which has the potential to promote weed invasion in the bushland and wetland areas, control where appropriate.
- C13. Provide assistance and support to community groups implementing weed control activities and ensure all rehabilitation works in the Reserve are coordinated by the City of Melville.

4.4 Native Fauna

Studies of native fauna present in the Reserve have identified a variety of birds (terrestrial and waterbirds), reptiles, amphibians and mammals utilise the bushland and wetland environments for nesting, roosting and feeding. However, the survey by Rodda (1986) of amphibians, fish, reptiles and mammals in the Reserve is now dated and the City of Melville should consider undertaken an updated survey. Recent sightings of the Bandicoot in the Reserve have not been confirmed, however the management of the bushland and wetland environments should continue to be implemented on the basis that these areas provide important habitat to a variety of native fauna including potentially rare species.

Management of fauna typically relates to the protection of habitats and vegetation. Management strategies implemented to protect the vegetation within the site from disturbance and degradation will assist in the preservation of faunal habitat. Access and provision of facilities should be restricted to that proposed in [Section 5](#) and shown in [Figure 6](#).

Habitat features such as logs, fallen trees and/or rocks should be kept in the bushland areas of the reserve. Hollows within logs, loose bark and dead trees can provide habitat and refuge for a range of fauna such as reptiles and should be introduced to rehabilitation areas from suitable areas as part of implemented rehabilitation programs. In addition, the use of nest boxes to attract native fauna should continue with installations monitored to maintain condition and ensure that they are not being used by introduced species.

Management Recommendations

- C14. Implement rehabilitation works to improve native fauna habitat.
- C15. Exercise care when implementing weed control works in and around the wetland areas to prevent impacts on the native fauna habitat, particularly, waterbirds and the Long-neck Turtle.
- C16. Progressively rehabilitate disturbed and degraded areas initially focussing efforts in areas that have greatest potential to impact on better quality vegetation areas (ie Priority Area 1) and using local native species where practicable.
- C17. Ensure the condition of nest boxes in the Reserve is maintained and that they are used exclusively by native fauna.
- C18. The City of Melville is to consider undertaking an updated survey in relation to amphibians, fish, reptiles and mammals.

4.5 Domestic and Feral Animals

The Piney Lakes Reserve Concept Plan adopted by the Council in 1992 recommended dogs should be prohibited from the core conservation area and only be allowed on the reserve in designated areas. Prior to the development of the Concept Plan, the reserve had been used by dog owners to exercise their dogs off a lead and without restrictions.

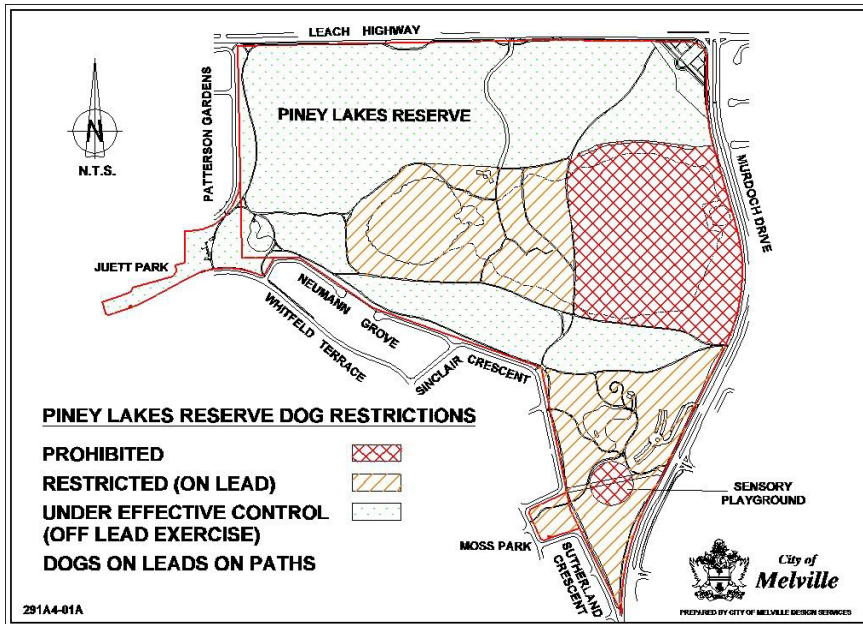
According to the Management Plan for Beeliar Regional Park, a key strategy of the Plan in relation to the management of dogs states: *“Ensure dogs are on a leash and under the effective control in the Park except for gazetted dog exercise areas. Exclude dogs from areas of the Park zoned for Conservation and Protection and any of the wetlands or water bodies of the Park.”*

The Plan refers specifically to Piney Lakes in stating: *“At Piney Lakes, dogs are allowed off the leash in the reserve but must be under control. This will need to be reassessed, in light of the conservation value of some sections of this reserve.”*

Accordingly, the City of Melville Ranger Services has identified that it has received a number of written requests for dog restrictions on Piney Lakes Reserve and there have been a number of incidents of dog attacks reported.

The City has identified that by providing areas where dogs must be restricted on a lead and a dog exercise area, people who use the reserve will have the choice of being able to use areas where they will not be in conflict with unrestrained dogs. Importantly, the management of the Reserve needs to be consistent with the City’s initiatives in relation to the implementation of environmental sustainability and best practice management at the Environmental Education Centre, and on this basis, restrictions on dog movement within the Reserve is required.

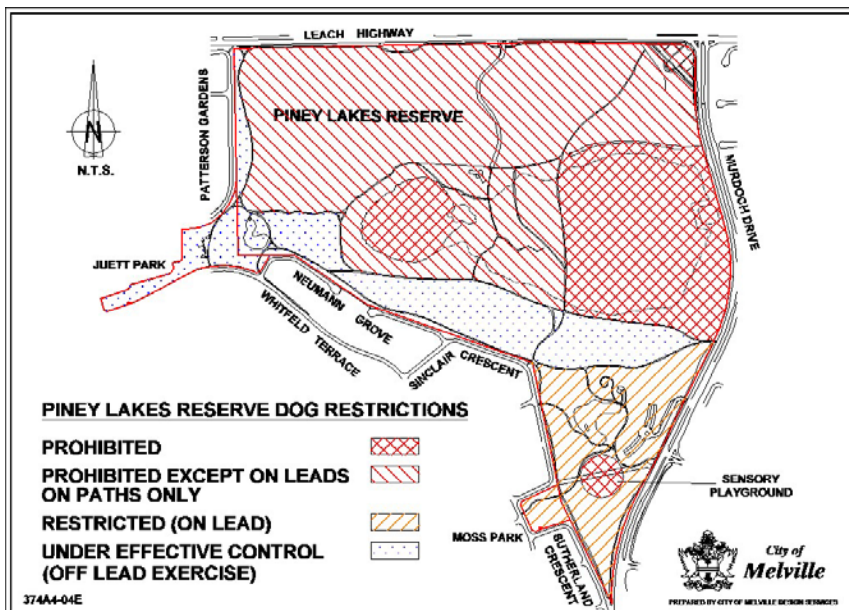
In February 2001, the Council approved an amendment to the City of Melville Dog Act – Local Laws Relating to Dogs to prohibit dogs from the eastern core conservation area and children’s playground at Piney Lakes and requires control of dogs (by leashing) in the central lake and the western core conservation area (bounded by the pathway) as shown on the following diagram.



Current Dog Restrictions in Piney Lakes Reserve

Prior to the draft management plan being written a public meeting was held at the Piney Lakes Environmental Education Centre to canvass the main issues to be included in the draft. At this meeting the majority of the residents in attendance considered it inappropriate for dogs to have relatively unrestricted access to much of the bushland and lake areas.

Dogs will continue to have off-lead access on the grassed areas at the south end of the reserve but will now be restricted from accessing the bushland and wetland areas on the north side. However, to allow residents access from the northern side of the reserve (Leach Highway) that still wish to experience the bushland environment and/or to access the grassed off-lead areas, dogs will be allowed access to all of the path network within the reserve as long as **they remain on a lead**.



Dog Restrictions in Piney Lakes Reserve as Proposed under this Management Plan

The exclusion of dogs from the bushland and wetland areas at Piney Lakes will ensure that the following impacts are prevented:

- Disturbance of habitat including trampling of native vegetation, especially newly established seedlings.
- Disturbance to soil and vegetation stimulating weed invasion and growth.
- Potential transmission of disease to native animals, mainly through excrement.
- Interruption of breeding cycles of native animals.
- Interference of native fauna territorial behaviours through scents left in urine and excrement.

Additional management of dogs in the Reserve needs to encourage owner management of dog waste by providing appropriate plastic bags and bins to enable owners to collect and dispose of dog waste. Rangers should patrol the area to ensure the Reserve is being used appropriately by dog owners.

Nearby residents should be encouraged to keep cats at home, especially at night and have them de-sexed to help control the feral cat populations. Residents should be discouraged from dumping unwanted litters within local parks and bushland areas. The implementation of cat curfews and banning cat ownership within the nearby areas should also be considered.

Other introduced animals such as foxes, rabbits and ravens have been recorded in the Reserve during previous studies. Limiting access and rubbish dumping, implementing weed control programs and rehabilitating degraded areas will assist in minimising populations of introduced species. Ravens are known to predate the eggs and young of other native bird species nesting in the Reserve.

Rabbits have the potential to hamper regeneration efforts and create conditions more suitable for weed species to proliferate. The total removal of rabbits from the reserve is probably not feasible, however their potential impact on the vegetation and habitats should be controlled through the use of temporary fencing, tree guards or brush to protect regenerating vegetation and weed control measures.

Fencing to prevent domestic and feral animals entering the Reserve is probably not feasible, particularly if community access is desired. Baiting for these species can have some impact particularly in controlling fox populations, however the baits are not target-specific and the death of pets can result. Implementation of a baiting program would require approval from the relevant agencies and notification of nearby residents and may not be acceptable for the Reserve.

Management should focus on improving habitat and refuge for fauna and enhancing local populations to ensure these are more resilient to the effect of predation from introduced predators. Community involvement and awareness promoting control of pets such as cats and dogs, and preventing dumping of unwanted litters is an important aspect of managing predation by introduced species.

Management Recommendations

- C19. Dogs will continue to have off-lead access on the grassed areas at the south end of the reserve but will now be restricted from accessing the bushland and wetland areas on the north side. However, to allow residents access from the northern side of the reserve (Leach Highway) that still wish to experience the bushland environment and/or to access the grassed off-lead areas, dogs will be allowed access to all of the path network within the reserve as long as **they remain on a lead**, as shown in the following diagram.
- C20. Install fencing around Piney Lakes (Option 1) and ultimately around the conservation area (Option 2), as discussed in Section 5.2.3 and shown in Figure 6.
- C21. Reserve to be patrolled by City of Melville Rangers, as appropriate, to actively enforce appropriate use of the Reserve by dog owners.
- C22. Ensure provision of dog waste bags and bins at appropriate locations within the Reserve.
- C23. Educate the public with signs and information (via the Environmental Education Centre) regarding the importance of the bushland and wetland to native fauna and the potential impacts that domestic and feral animals can have on these habitats.
- C24. Consider developing measures to reduce the impact of feral animals on native fauna.
- C25. Consider introducing a program to cull excessive numbers of the Australian Raven to ensure the survival of eggs and young of other native bird species nesting in the Reserve.
- C26. Consider imposing controls on domestic cats within surrounding development areas.

4.6 Disease Management

Evidence of the dieback disease (*Phytophthora cinnamomi*) has not been recorded in the Reserve.

Maintaining the Reserve as a dieback-free area will require that a number of measures are addressed as part of the overall management of the Reserve, as identified below.

Management Recommendations

- C27. Rationalise paths by close and rehabilitate informal tracks as shown in Figure 6.
- C28. Ensure all imported soil, gravel, mulch and plants used within the Reserve are free of *P. cinnamomi* or from a dieback free source.
- C29. Maintenance activities (such as fencing, track maintenance) to occur in dry soil conditions, where possible.

4.7 Wetland Management

The wetlands at Piney Lakes Reserve are classified as Conservation Category wetlands however the values of Piney Lake (the western wetland) have been significantly degraded through the direct and indirect affect of human activities within and in close proximity of the lake as well as past land uses. Indiscriminate access to the wetland margins and lake bed are also contributing to the degradation of the wetland. Consequently, the ecological processes and diversity is under threat. It is considered that the ecological values of the lake and associated fauna habitat can be improved if appropriate measures are implemented in the conservation and recreation areas of the Reserve, including:

- Rehabilitation of the Lake margin, surrounding wetland buffer and upland areas with local native species.
- Extension of the vegetated area around the eastern wetland to at least 50m from the wetland boundary, as shown in Figure 6 to intercept nutrients which may leach from the adjacent grassed area.
- City of Melville to maintain a fertiliser regime and irrigation management program over the grassed areas that has negligible risk of nutrients leaching to the wetland area. The fertiliser regime is to be consistent with the advice provided by Johnston (1997) which specifies the following maximum rates of application per year:

**TABLE 3
MAXIMUM YEARLY APPLICATION OF MAJOR NUTRIENTS IN THE
PARKLAND AREA**

Nutrient	Total Yearly Application (kg/hectare)
Nitrogen	50
Phosphorus	5
Potassium	30

4.7.1 Wetland Monitoring

Water Level and Quality Changes

According to the CALM *et al.* (2001), there is currently no comprehensive or consistent monitoring program for water levels or water quality of the wetlands of Beeliar Regional Park. Existing monitoring programs span a number of State and local government agencies and provide incomplete coverage of all wetlands within the Park.

As part of the preparation of the Nutrient and Irrigation Management Plan for Piney Lakes Reserve (Johnson, 1997), the City of Melville has implemented groundwater and surface water quality monitoring at Piney Lakes to ensure precise nutrient and irrigation management for the grassed area and to minimise the risk of nutrient export from the turf profile.

The program involves taking soil samples annually to determine the bicarbonate extractable phosphorus (BEP), total phosphorus, and the phosphorus retention index of the surface 10cm layer. As recommended by Johnson (1997), if the monitoring program records BEP levels greater than 10mg/kg, Phosphorus will not be applied for the following year unless indicated by leaf analysis. Leaf samples are generally taken monthly to determine both the phosphorus and nitrogen levels. If phosphorus levels exceed the BEP levels recommended by Johnson (1997) by more than 0.15%, then phosphorus is not be applied by the City of Melville.

In addition, Johnston (1997) proposed the implementation of a groundwater monitoring program, including installation of bores to the satisfaction of the WRC. Johnston recommended up to three bores, on the southern side of Piney Lake and the eastern dampland, and at least one directly upslope in the grassed area to monitor the level of nutrients in the groundwater resulting from recharge from the grassed area. The bores are currently monitored annually by the City of Melville to determine phosphorus and nitrogen concentrations and concentrations of heavy metals. Surface water samples are also collected from Piney Lake to monitor phosphorus and nitrogen levels.

Other water quality parameters such a pH and electrical conductivity should be monitored monthly to obtain a more detailed overview of the water quality of Piney Lakes.

There needs to be continued restrictions on the number of groups including local schools and users of Piney Lakes environmental Education Centre wanting to perform water quality monitoring, particularly biological (macroinvertebrates) monitoring. Macroinvertebrate communities can be sensitive to continued unnecessary disturbance and should be sampled at an appropriate time of year following strict sampling protocols and ethics with professional support.

All information collected is to form part of the monitoring database currently managed by the WRC and WC for the Beiliar wetlands.

Management Recommendations

- C30. City of Melville to implement biannual water quality and water level monitoring of groundwater bores and the surface water of Piney Lake in accordance with their current Department of Environment groundwater well licence.
- C31. Friends of Piney Lakes to perform monthly water quality monitoring (temperature, pH, electrical conductivity, turbidity, dissolved oxygen) of Piney Lake surface water to collect baseline information that contributes to the City of Melville, Water Corporation and Department of Environment databases.
- C32. Seasonal macroinvertebrate monitoring should be overseen by the City of Melville or other relevant professionals such as Ribbons of Blue/Waterwatch WA and for specific relevant university research projects to limit the damage of over sampling.
- C33. Rehabilitate the Lake margin, surrounding wetland buffer and upland areas with local native species.

- C34. Extend the vegetated area around the eastern wetland to at least 50m from the wetland boundary, as shown in Figure 6, to intercept nutrients which may leach from the adjacent grassed area.
- C35. City of Melville to maintain a fertiliser regime and irrigation management program over the grassed areas that has negligible risk of nutrients leaching to the wetland area. The fertiliser regime is to be consistent with the maximum rates of application per year identified in Table 3.

4.8 Artificial Wetlands

Two artificial wetlands have been constructed in the Reserve, following the recommendations contained in the Concept Plan (Ecoscape and Landmarc, 1992), to provide further habitat for water birds and other native fauna.

According to recent surveys of the Reserve by Gole (2003), the artificial wetlands provide habitat for a number of birds including important species, the Hardhead, a species of diving duck favouring deeper water and the Yellow-rumped Thornbill, a small insectivore.

The establishment of native vegetation at the lake margins is limited and further planting of wetland species is recommended, particularly sedges, rushes and low shrub species to improve the habitat of these species and to promote the use of the wetland by other native birds.

Two additional artificial lakes were recommended in the Concept Plan, however these have not been constructed to date. During the community workshop, participants considered the construction of any additional lakes in the Reserve is unnecessary.

Management Recommendations

- C36. Establish riparian vegetation at the margins of the artificial wetlands.
- C37. The construction of the two additional artificial wetlands identified in the Concept Plan is considered to be unnecessary.

4.9 Fire

Piney Lakes Reserve is located with the area covered by the Department of Conservation and Land Management's Beeliar Regional Park Fire Response Plan. The Plan was developed by CALM in conjunction with Fire and Emergency Services Authority (FESA) and relevant local governments to help ensure effective response to unplanned fire by the responsible agencies and outlines practices such as:

- Fire control actions and strategies that protect environmentally sensitive areas from unplanned fire;
- Undertaking pre-suppression activities including reducing fuel loads by mowing or slashing large open grassed areas. Mown or slashed areas should be delineated so

that mowing practices do not adversely affect natural regeneration and fauna habitat;

- Maintaining a fire record system of all fires in the Park including date and cause; and
- Ensuring an effective network of firebreaks is maintained.

Piney Lakes Reserve is also located with the gazetted Metropolitan Fire District, and as such fire suppression is the responsibility of the FESA. Pre-suppression works and post suppression follow-up works are the responsibility of the City of Melville.

Access for emergency vehicles within the Reserve is currently adequate, and in the northern region of the Reserve the extent of informal tracks would enable easy traverse of this area in the event of a fire.

Firebreaks are currently maintained by the City of Melville at the northern and eastern boundary of the Reserve and open parkland areas provide a buffer between residential areas located at the southern and western boundaries.

To maximise 'fire proofing' of the Reserve there is opportunity to install fire couplings around the perimeter of the bushland/wetland area via a connection to the ring main that is located around the perimeter of the Reserve. The couplings will allow emergency vehicles to directly connect to a pressurised water main in the event of a fire in the Reserve. The proposed location of the fire couplings is shown in Figure 6.

Other 'fire proofing' strategies include the implementation of weed control measures to reduce high fuel loading species such as Veldt Grass which will potentially reduce the impact of a fire on the Reserve.

Management Recommendations

- C38. Implement fire management strategies in the Reserve in accordance with the City of Melville's Bushfire Management Strategy (1995).
- C39. Maintain the existing provisions for fire access within the Reserve, as shown in Figure 6.
- C40. Install fire couplings, as shown in Figure 6, to provide direct access to pressurised water in the event of a fire in the Reserve.

4.10. Classification under the Land Administration Act

It is recommended that the Piney Lakes Management Plan be aligned with the Beeliiar Region Park Management Plan with respect to classifications under the Land Administration Act. The intent of the BRPMP is that Reserves created from WAPC freehold land and vested with the Conservation Commission of Western Australia will be afforded an appropriate purpose for the protection and enhancement of (Beeliiar Regional) Park values and will be classified as Class A under the LAA.

Specifically in relation to Piney Lakes Reserve, the intent of the BRPMP is that, as agreed to by the relevant local government, reserves created from WAPC freehold land and

vested with the local government will be reserved for the purpose of 'Conservation and Recreation' and afforded similar tenure arrangements as the reserves vested in the Conservation Commission of Western Australia.

In other words, the Piney Lakes Reserve, which was created from WAPC freehold land, vested with the City of Melville and reserved under the BRPMP as Area 5 'Conservation and Protection' and Area 6 'Recreation', should in future, with the agreement of the City of Melville, be classified as Class A under the LAA.

Management Recommendation

- C41. Piney Lakes reserve should in future, with the agreement of the City of Melville, be classified as Class A under the Land Administration Act.

5. RECREATION AND ACCESS MANAGEMENT

5.1 Principal Recreation Direction

The principal recreation directions for the Reserve will be to:

- Ensure that the local community and visitors to the Reserve appreciate the natural and cultural values and feel ownership of the bushland; and
- To maintain the level of recreational activities currently accommodated and to ensure these activities are consistent with the conservation management objectives for the Reserve.

5.2 Access Controls

5.2.1 Pedestrian Access

The provision of paths for pedestrian, cycle and disabled access in the Reserve was implemented recently by the City of Melville to progress the recommendations of the Concept Plan.

The recent formalisation of paths and construction of boardwalks in the bushland and wetland areas has significantly reduced the extent of disturbance that is associated with human use of these areas. The paths and boardwalks within the conservation area have been strategically located utilising existing tracks to minimise vegetation clearing wherever possible. While pedestrian access within the conservation area is generally adequate, the installation of a sealed path is proposed on the eastern boundary of the existing fencing along Murdoch Drive. In addition, the formalisation of an existing path which runs from Murdoch Drive to the Environmental Centre access road and proposed picnic area is also recommended. The location of the proposed paths is shown in Figure 6.

Path rationalisation has been reviewed as part of this Management Plan and includes closing and rehabilitating a number of the old Forestry Department and other informal tracks within the Reserve, as shown in Figure 6.

Management Recommendations

- R1. Install a sealed access path along a section of Murdoch Drive, as shown in Figure 6.
- R2. Formalise an existing path to provide access from Murdoch Drive to the Environmental Centre access road and proposed picnic area, as shown in Figure 6.
- R3. Close and rehabilitate informal tracks within the Reserve, as shown in Figure 6.

5.2.2 Vehicle and Motorbike Access

The use of off road vehicles and motorbikes is incompatible anywhere in the Reserve.

Public vehicle access to the Reserve is provided to the main recreation area in the southern region of the Reserve from Murdoch Drive and to the Education Centre from Leach Highway. Perimeter fencing currently prevents vehicles and motorcycles from entering the Reserve.

In the event of a fire in the Reserve, access to the bushland and wetland areas is available from the Environment Centre access road and car parking area. In addition, the existing path network provides access at the periphery of the bushland and into the wetland in places. While most of the informal tracks are recommended for rehabilitation, the track at the northern boundary will be maintained for fire access purposes.

Management Recommendations

- R4. The use of off-road vehicles and motorbikes is incompatible with the conservation and recreational objectives of the Reserve.
- R5. Maintain the track at the northern boundary for fire access purposes.

5.2.3 Fencing

It was identified during the community workshop that additional restrictions on access are required, particularly to differentiate between the conservation and recreation areas.

At present, a 1.2m high post and wire fence is located at the perimeter of the Reserve to restrict indiscriminate access. The community identified that additional fencing is required to provide a boundary between the conservation area and parkland.

The City of Melville has proposed an interim measure of installing a fence around the periphery of the western wetland, following the alignment of the existing path and boardwalk. In the longer term, the City will consider the installation of a fence at the boundary of the conservation and parkland areas. The two fencing options are shown in Figure 6.

In both instances, the fence is to be of an appropriate design and aligned to prevent any clearing of native vegetation.

If it is determined feasible to install fencing at the interface of the conservation area and parkland area, the fence is to connect to the existing boundary fencing along Murdoch Drive and Leach Highway.

Furthermore, consideration should be given to upgrading the existing fencing at the perimeter of the Reserve to a ringlock mesh instead of wire strand, once funding becomes available.

Management Recommendations

- R6. Install appropriate fencing around the perimeter of Piney Lake as shown in Figure 6, following the alignment of the existing pathway. Allowance for gated access is to be made at locations shown in Figure 6.

- R7. As a secondary option (Option 2), install appropriate fencing at the interface of the conservation area and recreation area, as shown in Figure 6.
- R8. Consider upgrading the existing fencing at the perimeter of the Reserve to a ringlock mesh instead of wire strand, once funding becomes available.

5.2.4 Gates

The installation of fencing around the conservation area will require the provision of suitable gates to provide pedestrian and disabled access. The installation of a kissing or zig-zag gate will restrict the passage of human traffic and will deter any bike riders trying to enter the conservation area that can potentially disturb the bushland and wetland environments. The location of the pedestrian/disabled access points is shown in Figure 6.

Allowance for emergency or maintenance vehicle access has also been addressed at the boundary of the conservation fencing and includes up to 2 locations where vehicle access may be required between the conservation and recreation areas. These gates will be standard farm style gates which can be locked, if required.

Management Recommendations

- R9. Install kissing or zig-zag type gates in strategic locations, as shown in Figure 6.
- R10. Install vehicle access gates in locations identified in Figure 6.

5.3 Car Parking

The recent provision of car parking at the Environmental Education Centre and the sensory playground adjacent to Murdoch Drive as recommended in the Reserve Concept Plan (Ecoscape and Landmarc, 1992) has increased the recreational catchment of the Reserve and has made the Reserve and associated facilities more accessible to the wider community.

Parking is currently available for approximately 50 cars at the Environmental Education Centre and up to 55 cars at the sensory playground. Informal parking is also along roads at the south-western boundary of the Reserve. The community has identified that the current provisions for car parking at the Reserve is more than adequate and no further parking needs to be installed.

The community has raised concerns regarding the safety of people using the car parking areas at night and has suggested that lighting is installed in these areas. The community identified a preference for solar powered lighting, particularly at the Environmental Education Centre car park.

Management Recommendations

- R11. No further provision for car parking is required in the Reserve.

- R12. Install lighting in the car parking areas at the Education Centre and Sensory Playground. Consider the installation of solar-powered lighting, particularly at the Environmental Education Centre car park.

5.4 Signage

Interpretive signage has been installed in the conservation area by the City of Melville. The signage provides visitors to the Reserve with information relating to the bushland and wetland ecology. Workshop participants have identified that additional signage may be installed which provides further information on the environmental values of the Reserve. The development of interpretive signage within the Reserve should be undertaken in consultation with the Friends of Piney Lakes and CALM.

Existing signs which provide information regarding dog restrictions and allowances within the Reserve require review. According to workshop participants the signage is too detailed and is likely to be overlooked for this reason. Simple signage which outlines areas where dog exercising is permitted or prohibited needs to be installed in the Reserve, particularly at entrances to the conservation area. CALM has requested that the City of Melville is to consider CALM's Regional Park Sign System when replacing or installing new signs within Piney Lakes Reserve.

CALM has also prepared a Communication Plan for Perth's Regional Parks. The Plan highlights preferred information and interpretive messages to be presented at each of the Parks. According to CALM (2003), the interpretive plan for Beeliar Regional Park will be prepared in the near future.

Management Recommendations

- R13. Consider the installation of additional interpretive signage within the conservation area in consultation with the Friends of Piney Lakes and CALM and in accordance with the existing signage formats currently used in the Reserve and other parts of Beeliar Regional Park to promote community education/awareness of native flora and fauna.
- R14. Improve the clarity of existing signage relating to dog restrictions in the Reserve.

5.5 Litter and Waste Management

The City of Melville currently manages litter generated by the public utilising the Reserve by the installation of bins at strategic locations. No additional bins are proposed within the Reserve to collect litter.

Community participants identified that the provision of bins and bags for the collection of dog waste needs to be increased within the recreational area at the Reserve. These should be located strategically to allow disposal collection by the City and so that they are appropriately utilised by dog owners.

The City also currently allows for the stockpiling of mulched greenwaste on a cleared track in the northern region of the Reserve. The storage of this material may have

implications for weed invasion and disease, therefore it is advised that a more suitable location, outside the Reserve, be identified for this purpose. It is recommended that mulched greenwaste should not be used in the Reserve on the basis that it may promote weed invasion and non-locally native species. However, the Friends of Piney lakes have advised that the use of greenwaste mulch can be beneficial in certain revegetation programs within the reserve such as in heavily degraded areas with no overstorey plants and heavy weed infestations.

Management Recommendations

- R15. City of Melville to investigate if additional dog waste bins and bags are required in the recreation area at the Reserve.
- R16. City of Melville to investigate the relocation of the greenwaste stockpile from the Reserve.
- R17. Greenwaste mulch should not be used in rehabilitation projects within the Reserve due to potential weed invasion, unless under a controlled situation for trial purposes.

5.6 Interaction with the Community & Other Organisations

The continuation of community involvement (eg. local residents, schools, interest groups) is desirable to ensure that the local community has a sense of ownership in the Reserve as this will afford a level of protection against the threat of damage by fire, vandals, etc. In addition, promoting an understanding of the sensitivity of the wetland and bushland ecosystems amongst local residents and the community will assist in reducing the inappropriate use of the Reserve (eg. uncontrolled access, rubbish dumping).

The development of a sense of ownership can be achieved by involving the local community in both the implementation of works and in future planning for the Reserve. The Friends of Piney Lakes Group should be encouraged to maintain their involvement in the management of the Reserve.

The involvement of Greening Australia (WA) in community development programs such as rehabilitation works within the Reserve, and particularly the Stepping Stones project, will assist in brings together schools, their local community and local government to protect and restore the ecological health of the Reserve. The implementation of Stepping Stones will enable a more integrated and coordinated approach to rehabilitation works within the Reserve.

It is important to ensure that the efforts of the local community towards the future management of the Reserve are recognised. This can be achieved by installing signage which identifies existing and future management work undertaken by a local community group and provides a point of contact at the City of Melville if community members are interested in becoming involved.

Other organisations and agencies such as the Beeliar Regional Park Community Advisory Committee, Weeds Action Network, the Wildflower Society and WRC may be able to

assist with aspects of the management of the Reserve, particularly in relation to the implementation of monitoring as part of the management of Beeliar Regional Park.

Liaison between community volunteers and organisations and a point of contact at the City of Melville and other managing agencies or assigned managing body is essential to ensure a coordinated approach.

Management Recommendations

- R18. City of Melville to continue to support the Friends of Piney Lakes through the provision of information and resources.
- R19. Recognise the works implemented by the Friends Group through the installation of signage.
- R20. City of Melville to work with Greening Australia (WA) to facilitate the implementation of the Stepping Stones project.
- R21. City of Melville to continue to work with the community through activities with the Piney Lakes Environmental Education Centre.

6. HERITAGE MANAGEMENT

Piney Lake is an important site for the Aboriginal people. All aspects of the management of the Reserve will give consideration to the significance of the area and the presence of registered sites. The preparation of this Management Plan will result in better management of the Reserve and the conservation of the lake and surrounding areas for the future. The registered Aboriginal heritage sites located within the Reserve are protected under provisions of the Aboriginal Heritage Act 1972 and clearance is required from the Department of Indigenous Affairs prior to any disturbance of these sites.

Local Aboriginal people will be consulted prior to and during implementation of the measures outlined in this Management Plan, and prior to any disturbance of Aboriginal heritage sites. Interpretive signage will recognise the significance of the area to the Aboriginal people. Opportunities to involve the local Aboriginal community in management activities within the Reserve will be explored as part of the discussions.

Management Recommendations

- H1. Ensure the implementation of management measures is in accordance with the requirements of the *Aboriginal Heritage Act 1972*.
- H2. Incorporate information on the cultural values into interpretative material and facilities where feasible.
- H3. Liaise with Aboriginal groups to discuss proposed works and determine possible involvement in the management of the Reserve.

7. EDUCATION AND RESEARCH

Piney Lakes Reserve offers opportunities for research into bushland management, including rehabilitation and wetland ecology.

The priorities for monitoring have been defined by the following key performance indicators:

- wetland health including water quality, water levels, and vegetation and fauna habitat condition;
- bushland condition and composition; and
- use of the Reserve by native fauna.

Monitoring of water quality and water levels in bores and Piney Lake is to continue and is to be expanded to include vegetation condition, weed and dieback mapping, and community use and comments.

The local community should be encouraged to participate in monitoring within the Reserve. All levels of educational institutions can perform monitoring as well as community based groups such as the Wildflower Society, Birds Australia and local “friends of” groups. Tertiary institutions could have an instrumental role in investigating management issues such as bushland regeneration. It is important however, that a coordinated and consistent approach to the monitoring is adopted.

Implementation of management strategies identified in this Management Plan will be an on-going process that should be flexible in responding to changes in the natural environment, the recreational use of the environmental and community values. As such, a program of monitoring the success of the strategies proposed in this Management Plan will be essential for the purposes of reviewing and updating the Plan in 5 years. This will ensure that the aims and objective of the Plan have been achieved and that any new developments in management techniques can be utilised.

Management Recommendations

- ER1. Promote research activities within Piney Lakes Reserve through liaison with relevant agencies and educational institutions.
- ER2. City of Melville to continue monitoring activities at Piney Lakes Reserve.
- ER3. Routinely monitor changes in bushland condition and weed distribution, fire events, visitor usage and impacts of activities.

8. IMPLEMENTATION

8.1 Prioritisation of Management Proposals

The following table provides a list of the management strategies included in this Plan. Each strategy has been assigned a priority rating for implementation within the timeframe of the Plan.

The rating system applicable as part of this Management Plan is as follows:

- High [H] Primary importance/implement immediately (within 2 years)
- Medium [M] Secondary importance/implement within 2 – 5 years
- Low [L] Longer term consideration/implement within 5 - 10 years

Responsibility for implementing or overseeing implementation of the management strategy is also identified in the table.

**TABLE 4
PRIORITISATION OF MANAGEMENT STRATEGIES**

Management Strategy		Rating	Responsible Agency
CONSERVATION			
Revegetation			
C1	Revegetation works should form part of a broader rehabilitation project which includes weed control, follow-up monitoring and implementation of remedial works, if necessary.	H	CoM, FPLR
C2	Revegetation to work from Priority Area P1, to P2 followed by P3, with focal points to include old forestry tracks, informal paths and tracks and degraded areas as shown in Figure 6.	H	CoM, FPLR
C3	Use mature tubestock of locally native species in revegetation works.	H	CoM, FPLR
C4	Undertake planting/seeding in autumn/winter.	M-H	CoM, FPLR
C5	Ensure random planting when using tubestock.	H	CoM, FPLR
Invasive Weeds			
C6	Prepare weed mapping for the Reserve, identifying the type and distribution of weed species in the Reserve.	H	CoM, FPLR
C7	Implement weed control within the Reserve according to the weed mapping and the Rehabilitation Priority Areas delineated in Figure 6. Work from Priority Area 1 to 3.	H	CoM, FPLR
C8	Any weed control measures implemented in the Reserve needs to consider the potential habitat that the weed may be providing for native fauna (ie. the habitat provided by <i>Typha</i> in the case of the Long-necked Turtle) and the potential impacts of herbicide application on the water quality of the wetland environments.	M-H	CoM, FPLR
C9	Any weed control activities implemented in the Reserve are to include a monitoring period so that remedial work can be implemented, if necessary.	H	CoM, FPLR
C10	Ensure all weed control activities are immediately followed by revegetation or works to augment natural regeneration.	H	CoM, FPLR
C11	Ensure species selected for amenity plantings in the parkland areas are not potentially invasive.	M-H	CoM
C12	Monitor sprinkler overspray which has the potential to promote weed invasion in the bushland and wetland areas, control where appropriate.	H	CoM
C13	Provide assistance and support to community groups implementing weed control activities and ensure all	As required	CoM

Management Strategy		Rating	Responsible Agency
	rehabilitation works in the Reserve are coordinated by the City of Melville.		
Native Fauna			
C14	Implement rehabilitation works to improve native fauna habitat.	H	CoM, FPLR
C15	Exercise care when implementing weed control works in and around the wetland areas to prevent impacts on the native fauna habitat, particularly, waterbirds and the Long-neck Turtle.	H	CoM, FPLR
C16	Progressively rehabilitate disturbed and degraded areas initially focussing efforts in areas that have greatest potential to impact on better quality vegetation areas (ie Priority Area 1) and using local native species where practicable.	H	CoM, FPLR
C17	Ensure the condition of nest boxes in the Reserve is maintained and that they are used exclusively by native fauna.	M	CoM, FPLR
C18	The City of Melville is to consider undertaking an updated survey in relation to amphibians, fish, reptiles and mammals.	M	CoM
Domestic and Feral Animals			
C19	Dogs will continue to have off-lead access on the grassed areas at the south end of the reserve but will now be restricted from accessing the bushland and wetland areas on the north side. However, to allow residents access from the northern side of the reserve (Leach Highway) that still wish to experience the bushland environment and/or to access the grassed off-lead areas, dogs will be allowed access to all of the path network within the reserve as long as they remain on a lead , as shown in the following diagram.	H	CoM
C20	Install fencing around the perimeter of Piney Lake (Option 1) and ultimately around the conservation area (Option 2), as discussed in Section 5.2.3 and shown in Figure 6.	H (Option 1) M (Option 2)	CoM
C21	Reserve to be patrolled by City of Melville Rangers, as appropriate, to actively enforce appropriate use of the Reserve by dog owners.	M	CoM
C22	Ensure provision of dog waste bags and bins at appropriate locations within the Reserve.	H	CoM
C23	Educate the public with signs and information (via the Environmental Education Centre) regarding the importance of the bushland and wetland to native fauna and the potential impacts that domestic and feral animals can have on these habitats.	M-H	CoM
C24	Consider developing measures to reduce the impact of feral animals on native fauna.	M-H	CoM
C25	Consider introducing a program to cull excessive numbers of the Australian Raven to ensure the survival of eggs and young of other native bird species nesting in the Reserve.	M-H	CoM
C26	Consider imposing controls on domestic cats within surrounding development areas.	M-H	CoM
Disease			
C27	Rationalise paths by close and rehabilitate informal tracks as shown in Figure 6.	H	CoM, FPLR
C28	Ensure all imported soil, gravel, mulch and plants used within the Reserve are free of <i>P. cinnamomi</i> or from a dieback free source.	H	CoM
C29	Maintenance activities (such as fencing, track maintenance) to occur in dry soil conditions, where possible.	H	CoM
Wetlands			
C30	City of Melville to implement biannual water quality and water level monitoring of groundwater bores and the surface water of Piney Lake in accordance with their current DoE groundwater	M	CoM in consultation with DoE (formerly WRC) and WC

Management Strategy		Rating	Responsible Agency
	well licence.		
C31	Friends of Piney Lakes to perform monthly water quality monitoring (temperature, pH, electrical conductivity, turbidity, dissolved oxygen) of Piney Lake surface water to collect baseline information that contributes to the City of Melville, Water Corporation and Department of Environment databases.		
C32	Seasonal macroinvertebrate monitoring should be overseen by the City of Melville or other relevant professionals such as Ribbons of Blue/Waterwatch WA and for specific relevant university research projects to limit the damage of over sampling.		
C33	Rehabilitate the Lake margin, surrounding wetland buffer and upland areas with local native species.	H	CoM, FPLR
C34	Extend the vegetated area around the eastern wetland to at least 50m from the wetland boundary, as shown in Figure 6, to intercept nutrients which may leach from the adjacent grassed area.	M-H	CoM, FPLR
C35	City of Melville to maintain a fertiliser regime and irrigation management program over the grassed areas that has negligible risk of nutrients leaching to the wetland area. The fertiliser regime is to be consistent with the maximum rates of application per year identified in Table 3.	H	CoM
Artificial Wetlands			
C36	Establish riparian vegetation at the margins of the artificial wetlands.	M-H	CoM
C37	The construction of the two additional artificial wetlands identified in the Concept Plan is considered to be unnecessary.	-	-
Fire			
C38	Implement fire management strategies in the Reserve in accordance with the City of Melville's Bushfire Management Strategy (1995).	M-H	CoM
C39	Maintain the existing provisions for fire access within the Reserve, as shown in Figure 6.	H	CoM
C40	Install fire couplings, as shown in Figure 6, to provide direct access to pressurised water in the event of a fire in the Reserve.	M-H	CoM
Classification under the Land Administration Act			
C41	Piney Lakes Reserve, should in the future, with the agreement of the City of Melville be classified as Class A under the Land Administration Act.	L	CoM, DOLI
RECREATION AND ACCESS MANAGEMENT			
Access Management			
R1	Install a sealed access path along a section of Murdoch Drive, as shown in Figure 6.	L-M	CoM
R2	Formalise an existing path to provide access from Murdoch Drive to the Environmental Centre access road and proposed picnic area, as shown in Figure 6.	L-M	CoM
R3	Close and rehabilitate informal tracks within the Reserve, as shown in Figure 6.	H	CoM, FPLR
R4	The use of off-road vehicles and motorbikes is incompatible with the conservation and recreational objectives of the Reserve.	H	CoM
R5	Maintain the track at the northern boundary for fire access purposes.	H	CoM
Fencing			
R6	Install appropriate fencing around the perimeter of Piney Lake as shown in Figure 6, following the alignment of the existing pathway. Allowance for gated access is to be made at locations shown in Figure 6.	H	CoM
R7	A secondary option (Option 2), to be considered by the CoM is	M	CoM

Management Strategy		Rating	Responsible Agency
	the installation of fencing at the interface of the conservation area and recreation area, as shown in Figure 6.		
R8	Consider upgrading the existing fencing at the perimeter of the Reserve to a ringlock mesh instead of wire strand, once funding becomes available.	M-H	CoM
Gates			
R9	Install kissing or zig-zag type gates in strategic locations as shown in Figure 6.	M-H	CoM
R10	Install vehicle access gates in locations identified in Figure 6.	M-H	CoM
Car Parking			
R11	No further provision for car parking is required in the Reserve.	-	-
R12	Install lighting in the car parking areas at the Education Centre and Sensory Playground. Consider the installation of solar-powered lighting, particularly at the Environmental Education Centre car park.	M-H	CoM
Signage			
R13	Consider the installation of additional interpretive signage within the conservation area in consultation with the Friends of Piney Lakes and CALM and in accordance with the existing signage formats currently used in the Reserve and other parts of Beeliar Regional Park to promote community awareness/education of native flora & fauna.	M	CoM, FPLR, CALM
R14	Improve the clarity of existing signage relating to dog restrictions in the Reserve.	H	CoM
Litter and Waste Management			
R15	City of Melville to investigate if additional dog waste bins and bags are required in the recreation area at the Reserve.	H	CoM
R16	City of Melville to investigate the relocation of the greenwaste stockpile from the Reserve.	M-H	CoM
R17	Greenwaste mulch should not be used in rehabilitation projects within the Reserve, unless under a controlled situation for trial purposes.	H	CoM, FPLR
Community Involvement			
R18	City of Melville to continue to support the Friends of Piney Lakes through the provision of information and resources.	H	CoM
R19	Recognise the works implemented by the Friends Group through the installation of signage.	M-H	CoM
R20	City of Melville to work with Greening Australia (WA) to facilitate the implementation of the Stepping Stones project.	M-H	CoM; GAWA
R21	City of Melville to continue to work with the community through activities with the Piney Lakes Environmental Education Centre.	M-H	CoM
HERITAGE MANAGEMENT			
H1	Ensure the implementation of management measures is in accordance with the requirements of the <i>Aboriginal Heritage Act 1972</i> .	As required	CoM
H2	Incorporate information on the cultural values into interpretative material and facilities where feasible.	M-H	CoM
H3	Liaise with Aboriginal groups to discuss proposed works and determine possible involvement in the management of the Reserve.	As required	CoM
EDUCATION AND RESEARCH			
ER1	Promote research activities within Piney Lakes Reserve through liaison with relevant agencies and educational institutions.	M	CoM
ER2	City of Melville to continue monitoring activities at Piney Lakes Reserve.	M	CoM
ER3	Routinely monitor changes in bushland condition and weed distribution, fire events, visitor usage and impacts of activities.	M-H	CoM, FPLR

CoM	City of Melville
DOLI	Dept of Land Information
FPLR	Friends of Piney Lakes Reserve
CALM	Dept. of Conservation and Land Management
GAWA	Greening Australia (WA)
WRC	Water and Rivers Commission
WC	Water Corporation

8.2 Costing and Status of Management Proposals

The following table is to be updated by the City of Melville annually during the period of this Management Plan.

TABLE 5
STATUS OF MANAGEMENT PROPOSALS IN THE PINEY LAKES RESERVE

Item	RECOMMENDATION	PRIORITY	STATUS	Capital				
				2003 / 04	2004 / 05	2005 / 06	2006 / 07	2007 / 08
Maintenance								
C8	Prepare weed mapping	High						
C9	Weed Control – Priority Area 1	High						
C9	– Priority Area 2	High						
C9	– Priority Area 3	High						
C13	Provide assistance to comm. Groups (for revegetation and weed control works)	High						
C19	Provide dog waste bags and bins	High						
Capital								
C2	Revegetation – Priority Area 1	High						
C2	– Priority Area 2	High						
C2	– Priority Area 3	High						
R1	Install sealed access paths as shown in Figure 6	Low-Medium						
R6	Install 1.2m high post and ringlock fencing at the perimeter of Piney Lake (refer to Figure 6)	High						
R7	Install 1.2m high post and ringlock fencing at the interface of the conservation and recreation area (refer to Figure 6)	Medium						
R9	Install kissing or zig-zag type gates in strategic locations as shown in Figure 6.	Medium - High						
R12	Install lighting in car parks (preferably solar lighting)	Medium - High						
R13	Install interpretive signage	Medium						
R12	Modify signage relating to dog restrictions	High						
Education / Promotion								
Monitoring / Performance Indicator								
Other								

8.3 Term of the Management Plan

The term of this plan will be for a period of 5 years after which time it should be reviewed and updated. A review of the progress of implementation and preparation of a detailed works program should be undertaken after the initial two years. Progress should be assessed by reviewing implementation of each of the management strategies outlined in this management plan and, where appropriate, the amount of money and resources spent in implementing each strategy identified. The need for further review prior to the end of the term should be determined at that stage. It should be acknowledged that maintenance and enhancement of the conservation values of the Piney Lakes Reserve is a

long-term project that will involve the City of Melville and the community working together over many years, and extending beyond the life span of this Management Plan.

Amendments to the plan can be made during this term as is necessary or desired to ensure the management strategies reflect those considered most appropriate to achieve the objectives and goals for the area.

The City of Melville will have overall responsibility for coordinating implementation of the recommendations made in this Management Plan and undertaking detailed review of the plan within 5 years.

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